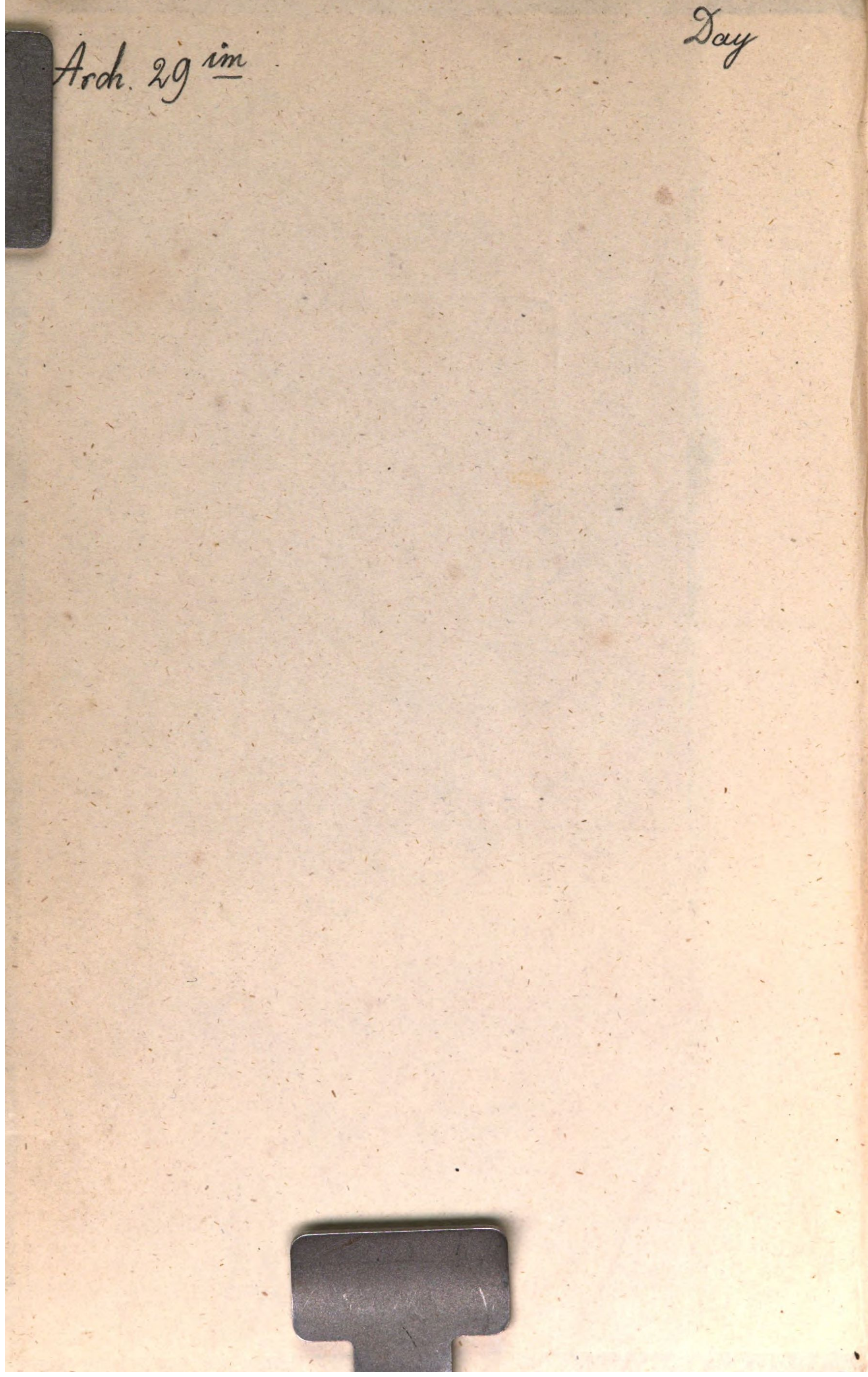






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Day



ON SOME POINTS IN CERTAIN THEORIES
CONCERNING THE
PURPOSE AND PRIMAL CONDITION
OF THE
GREAT PYRAMID OF JEEZEH:

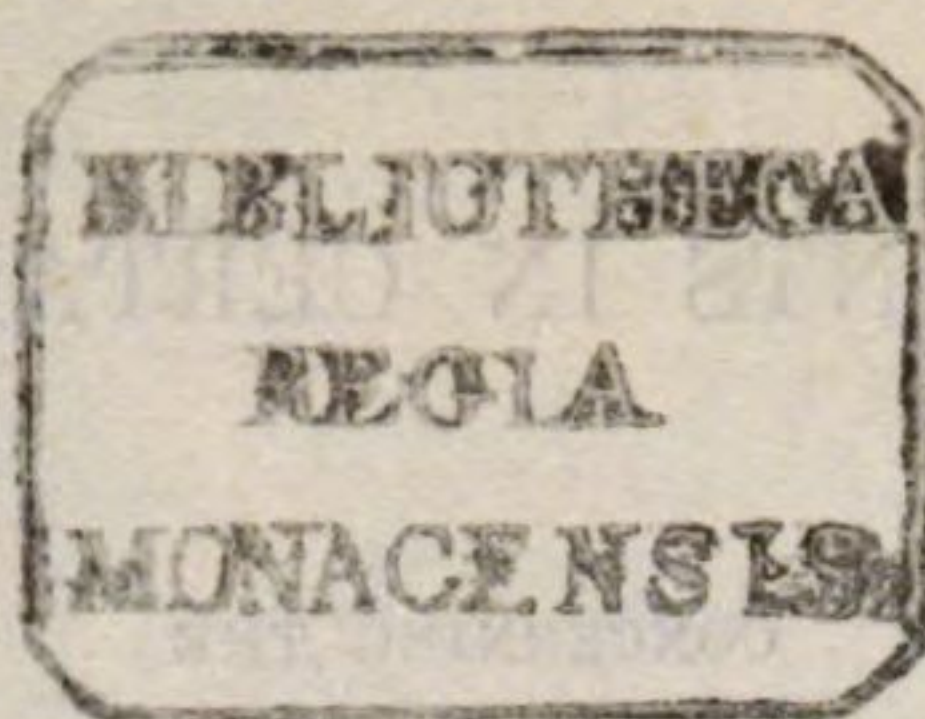
BEING
A PAPER READ TO THE PHILOSOPHICAL SOCIETY OF
GLASGOW, FEBRUARY, 1868.

BY
ST. JOHN VINCENT DAY, C.E., ETC.

AND IN CHIEF PART
A REPLY TO A LECTURE DELIVERED TO THE ROYAL
SOCIETY OF EDINBURGH,
JANUARY 20, 1868,

BY
SIR J. Y. SIMPSON, BART., M.D.

GLASGOW:
PRINTED BY BELL & BAIN, 41 MITCHELL STREET.
1868.



GREAT PYRAMID OF JERUSALEM

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A LECTURE DELIVERED TO THE ROYAL
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BY
MR J. T. RIMMON, B.A., M.D.

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THE
PURPOSE AND PRIMAL CONDITION
OF THE
GREAT PYRAMID OF JEEZEH.

THE subject of this paper is one concerning which the widest varieties of opinion have existed from the earliest times down to our own. The solution of that time-honoured question, seeking an exposition upon an immovable basis, as to the purpose for which the Great Pyramid was built, has occupied some of the most studious hours of many notable men in all those countries wherein education has advanced, and of many grades of society—men engaged in various spheres of action which belong to a high state of civilization; and yet, at the present day, it is difficult, if not in many points impossible, on account of the great diversity of creeds, and the evidence upon which such are held, to say that what is *popularly*, in contradistinction to what is *scientifically* considered as proof, can be found to bear out any one of the opinions that have been advanced.

As a starting-point, it is necessary for us to bear in mind, that the solution of all questions bearing on the purpose of the Pyramid builders in creating that structure is mainly to be effected by processes of investigation, based upon the sciences of geometry, arithmetic, and mathematics, pure and applied, as well as upon several branches of physical and archæological research; whilst certain other of its features have recently, in a most marvellous and unexpected way, been shown to interpret several hitherto unexplained or wrongly explained passages of Scripture. On the latter it is not my intention, nor have we time, to touch to-night. Let us, then, approach the subject carefully, unbiassed, accepting nothing but what is proved actually or by remarkable convincing coincidence; and as the interpretation of the Great Pyramid depends in so many respects upon numerical data, let us also bear in mind that a most exalted principle of modern science is, as it has been lately well expressed, “not to propound perfect and infallible dicta, but rather to know all about the limits of error attending every numerical datum;” and having ascertained their exact values, we are in a position to draw our conclusions, but not before.

I am fully conscious of the snares surrounding that question of

questions which I dare venture to approach ; neither do I come before you this evening without being aware of the pains and penalties that others have sought to inflict, by the lash of a half-taught opposition, on those who, possessing some inkling towards it, have earnestly sought to explain the meaning of the primeval Pyramid. In all probability there is no other question which man has ever found himself compelled to ask himself, that is circumscribed with so many points suggestive of answers, often eminently satisfactory for a long length of their course, but which by and by lead to others, or a series, wherein another or more than one question again arises, which by its very nature and occurrence detracts from or disproves the probability of a correct inference having been originally drawn.

Literary men, as contradistinguished to what we moderns understand by scientific men, as well as mathematicians, historians as well as travellers, professors of various creeds of religion as well as statesmen, physicists as well as archæologists, philologists, Egyptologists, and hierologists, have each in their turn endeavoured, by means of the various special modes of treatment brought to bear, to solve the most ancient material mystery that our world has ever been called upon to witness ; and what stands out as so characteristic and significant a feature of this grand old Pyramid, is, that it presents so many points calling for special investigation, one growing out of another, thus probably containing a richer store for seeking after than any other problem which our race has ever encountered. Then, although it has happened that the nature of its purpose has through long ages stood so mysteriously silent, is that any reason, it may well be asked, why labour towards finding out its portent should be ceased ? On the contrary, we are, I think, most solemnly involved in lending all the aid we possess towards discovering the intention—the purpose—of that gigantic and mightily majestic mass of masons' work which, during the lapse and turmoil of 4,000 years, has looked upon the stern vicissitudes of Egypt's troubled land ; but which for ages too, exhibiting itself, though rudely, by the robbery and devastation of ignorant and ruthless leaders, still stands supreme, the most ancient and perfect, while in character most exalted ; it is yet the noblest building on the face of the earth, securely sitting in tranquil ruin upon its desert hill, overlooking, as if bidding stately defiance, and showing itself yet unconquered.

The subject is, then, one which I approach with much diffidence ; and I can only wish it had fallen to the lot of abler treatment than mine to deal with. I desire, therefore, to explain that my reason for taking it up in the way I do before this Society is partly because it is widely felt the time has now come when studious men

must harness themselves with a deeper inquiry into the subject than ever; and I should not even yet have attempted this task but for the further reason that what is generally considered to be a very one-sided and weak, though perhaps *popularly* not *scientifically*-felt assault upon a very exalted and highly probable theory of the Great Pyramid, has recently been brought before the Royal Society of Edinburgh by Sir James Y. Simpson, who, I regret to assert, appears to have adopted the most unreasonable and superficial mode of attempt to upset what bears so large a shadow of truth, that can well be conceived. Sir James, in the early part of his attack, has, I may be excused for so saying, committed himself to the gross popular error of classifying the Great Pyramid with all other so-called pyramidal structures in Egypt, as well as in Ireland, forsooth! but then we should like to know what Sir James thinks of these far more marvellous than the Irish mounds—these entire ranges of so-called pyramids which are crowded together over vast regions of the American continent, the mounds of the Scioto Valley, those skirting the Missouri, Mississippi, and Ohio, or more particularly those of various parts of Mexico, and that vast pile, the great mound of Miamisburg—some of which are characteristic of, and some strikingly congruous with, the mounds in Ireland, as well as many another place in our world, and which are shown to have been for four purposes—namely, sepulchral, defensive against the inroads of enemies, and sites for the temples and sacrificial altars dedicated to those gods whom the erectors worshipped. Many of the works on the American continent are, to some extent, pyramidal—that is to say, they stand upon rectangular bases, and their four sides slope at the same angle; but I do not know of a case on record of any one of them terminating in a sharp pointed apex; whereas, of the alleged Irish pyramids, that of Newgrange in particular has been shown, by the most conclusive evidence, never to have been pyramidal at all—a mere roughly-shaped truncated conic mound, with inclined sides connecting it to a flat top.* Now, to any one who will take the trouble to compare the Great Pyramid with any other masonry structure, the features at once show themselves so distinct that no doubt can remain but the Great Pyra-

* From the very character of this Newgrange structure—a mere heap of loose stones—we may feel perfectly certain that it never could have been anything else than a very roughly shaped truncated conical mound. With such material as that of which it is composed, there are abundance of reasons for showing that it never could have terminated in an apex with its present side angle, and no doubt originally the angle approached the vertical more nearly than at present. The structure, probably, was made as high and steep as the angle of repose of the material would permit. For a further exposition on this point, see Appendix.

mid is perfectly unique, and stands out alone, unapproached by any other building, either externally or internally, that has ever been known to exist.

But of the various points and theories that naturally suggest themselves to our consideration, we must content ourselves this evening with examining one or two only, for the number is so great that many evenings would be necessary to submit the Pyramid to an exhaustive examination. Of the numerous theories that have from time to time been promulgated for us to give assent to, there are but two that need be considered—these are, the “tombic” theory and the “metrical” one. The others, from their very absurd and impossible nature, it would be folly to touch upon.

The Pyramid's Primal Condition Externally.

The foregoing remarks bring us at once to the question bearing on the primal condition of the Great Pyramid, as well as so-called (by some persons) pyramidal structures in general; for Sir James, in one part of his criticism, attempted—nevertheless, in howsoever powerless a manner—to indicate that “in various parts of the world very large sepulchral conical hills still existed, made sometimes of earth and sometimes of rubble, containing within them relatively small chambers for the dead, constructed of enormous stones, and galleries leading to these chambers.” Now, before we either dissent from or assent to his views, it behoves us to inquire into the original condition of some really pyramidal buildings. Then, first, as to the primal external condition of such structures, let us consider that of the Great Pyramid, gathering what we can from the writings of that old Halicarnassian—the usually faithful, and always considered reliable narrator of what he himself saw and was told—Herodotus; as well as from the order of things that the Pyramid itself presents to us at the present day. What, then, does our historian, in whose day the Pyramid was entire, say of it? He distinctly describes it as being then completely encased with a covering of hard, white limestone (which, by the way, has since his day by some persons been erroneously called marble); that each of its sides constituted a beautiful, smooth, and steep plane, so that the summit was inaccessible. But Herodotus has handed down to us something of far greater import than this. He, who lived in an age when the people of Egypt had fallen into a despicable condition of idolatry and departure from the greatest of great worships, that of Truth, and who had, therefore, in all probability been deprived of the whole true understanding of the Pyramid, but amongst whom a

handing down of something pertaining to quite another meaning than *tombic* still existed—he indeed points out that a *metrical* meaning was understood to be involved therein in his day. No matter how imperfect and wide of the truth that which Herodotus heard is, still it shows clearly that in earlier ages, when Egypt followed intellectual and obedient, in place of idolatrous and revolting leadership, a higher and, in all probability, a complete understanding of its purpose was known; and we may, therefore, with great probability—amounting, indeed, as much as anything can, at this distant period, to certainty—judge that what Herodotus gathered was merely the fragmentary end of a once whole insight, which had become degenerated and lost through the failure of that people to follow true guidance. Then what did Herodotus learn in proof of an anciently understood metrical meaning being involved in the structure of the Great Pyramid?—namely, this, “that the area of one of its sides was equal to the square of the height.” Such was written by him more than 2,000 years ago; and it is of grave and most weighty importance, as indicating to modern nations that the notion of a metrical meaning being involved with that ancient structure is by no means of recent birth; for although this belief has only of late years gained a fair share of attention from men of science, we should nevertheless remember that in Eastern countries there has always existed a tradition that, amongst other things, such as treasure or something connected with religion, science still was therein embodied, in contradistinction to certain other wild theories of Arabian authors and followers of the false Prophet Mahomet, applied to even the Great Pyramid and its somewhat kindred structures adjoining it at Jeezeh—those of Dashoor, Sakkarah, and elsewhere.

But let us not trust implicitly in Herodotus by his own statements; rather let us seek, by the light of these later times, to test the veracity of his account. For about 1,000 years the Great Pyramid has presented no such exquisite surface as Herodotus describes, the surface being what has been described of a “stepped or laddered character”—rough, weathered, and morose-looking; but then for centuries past the Pyramid’s base has been fortunately (and I use this word in a special sense) covered up and protected by the great mass of *débris* which had therearound, through long ages, accumulated, when, thanks to the labours of the French Academicians attached to the Napoleonic Expedition at the end of the last and the beginning of the present centuries, the sockets or holes of two of the stones forming the angles of the original casing were discovered and laid bare—but these corner stones themselves ruthlessly stolen away. A most memorable period in Pyramid literature is the month Pluviose, of the French Republican era

(January, 1801), when MM. Le Père and Coutelle discovered the north-west and north-east corner sockets; and the sockets, although empty, nevertheless, their occurrence was enough to prove the former existence of the beautiful covering described by Herodotus; and as units providing for the concretion of the whole, their being found is most significant. Thirty years and more passed by, when at last Colonel Howard Vyse came on the scene of labour amongst the monuments of ancient Egypt, with what result so far as concerns the Pyramid? Why, this, that he succeeded in finding two of the lowermost course of casing stones, and part of a third *in situ*, unmoved, there-adhering, firmly cemented, to the old stepped or laddered inner mass from a day nearly 4,000 years old. The joints of these casing stones showed themselves to be of the most exquisite workmanship that even we highly structural moderns can well conceive; for, when measured by the Colonel's engineer, Mr. Perring, he found them to be 4 feet 3 inches thick on the upper horizontal plane, 8 feet 3 inches at the bottom, 4 feet 11 inches at the back, and 6 feet 3 inches on the slant side, or hypotenuse, the joint surfaces being so true at the edges that the intersecting cement at these parts was barely appreciable; although, from the well-recognized system of rigidly bedding large blocks of stone which the Pyramid builders so well understood, there is little doubt but that the parts of the joints nearer to the centre were hollow. Until, however, these were discovered, no proof in a material form remained in these latter days that the exquisite stone casing brought from the distant limestone hills of Mokattam ever existed, to confirm the account given by Herodotus. It had been handed down to us that between the years 800 and 1000 A. D. the casing was robbed by certain Khaliphs, for the purpose of furnishing the material out of which were built the aqueducts and mosques for their new capital of El Kahireh—the modern Cairo; also that two enormous bridges or raised platforms were constructed to convey these robbed casing stones across the alluvial plain to the banks of the Nile. Sir Gardner Wilkinson sets all this forth very clearly; and yet with such facts known in Egypt, the modern Arabs, or some at least of them, assert that the Great Pyramid always had the (so-called by them) stepped or laddered exterior.* Most fortunate, then, is it that two and part of a third of these casing stones have in our day been found, and now, it is to be hoped, in part exist, protected by the

* It is most singular that modern men should, some of them, persist with this dogma, when so many writers (although they are never to be trusted as to the interior of the Pyramid, which, according to the various accounts, must have changed itself from age to age as each writer lived) speak of the taking down of the casing.

overlying mass of rubbish;* while all the greater proof shows itself in the numerous fragments of similar casing stones, all cut to one definite and unmistakeable angle, which have been picked up in large numbers by Professor Piazzi Smyth during his recent sojourn at the pyramids, and to the unmistakeable nature of which I am able to testify, through his kindness of allowing me to examine them.† Let disbelievers in the original angular value of the sides of the Pyramid examine the large casing stone fragments ‡ fitted into the model vested in the hands of the Royal Society of Edinburgh, as exemplifying one feature at least of the modern metrical theory of the Great Pyramid. They will then be more inclined to believe from that, than mere writing or mathematics appear to convince them—that is to say, if such exception-takers be convincible at all about anything as definite as fallible humanity can produce it.

* At the time these casing stones were uncovered, during Colonel Howard Vyse's explorations, they were much broken and disfigured by the Arabs and visitors to the Pyramid; so that, to prevent their being carried quite out of existence as a whole, the Colonel wisely ordered them to be covered up again. The Colonel states, however, that they were uncovered after he left, and *broken in pieces*. Doubtless, at some to-be-hoped not-far-distant day, when the platform on which the Pyramid stands shall be cleared on all sides, more of these important relics will be found.

† In a letter dated February 22, 1868, Professor C. Piazzi Smyth states to me, "Every single block, of all the hundreds of blocks which I examined of the *granite* part of casing of the Second and Third Pyramids, were so puddingy, decayed, and boulder-become near the edges, that no *hand-specimen* could have been knocked off that would show it had once been a casing stone; while with the limestone casing of the Great Pyramid you may find fragments of half an inch, which will give the casing-stone angle of two meeting planes." Such facts speak for themselves, and are strikingly significant that the Great Pyramid was intended by its architect (and he endowed with extraordinary foresight and understanding) to have been handed down through ages in its original form, and without alteration in its most important angle of side.

‡ What is thought by some others, at least in Edinburgh, besides Sir J. Y. Simpson, may be gathered from the label of the specimen case in the Museum of the Royal Society. It runs thus:—

Fragments of the ancient and long
lost "casing stones" of the Great Pyramid,

DATE 2170 B. C.;

Recovered A. D. 1865, and here compared practically with
models of the side angles of a theoretical π Pyramid,

(The π quality being believed to be peculiar to the Great Pyramid
alone, of all the Egyptian, or indeed any other, known and measured
Pyramidal buildings.)

See Transactions of Royal Society, Edinburgh, Vol. XXIV. p. 385.

All the facts which I have now brought together prove that not a shadow of doubt remains as to the reliability of that part of the account of Herodotus which is descriptive of the original external condition of the structure.

*The Present External State of the Great Pyramid.**

To make our comparison complete, we must consider the *present* external state of pyramidal structures, for even in this respect it is most necessary, in order to draw just inferences, to examine together the qualities of workmanship. The present exterior of the Great Pyramid now exhibits four stepped flanks, each so-called step forming a complete horizontal layer all around, and extending inwards for a considerable depth—nay, from the very character of the structure itself, there can hardly be a doubt but that each such layer extends completely throughout the mass, except, of course, in such places where the interior hollow of chambers and passages occur. The masonry of which this mass is constituted is of a very high order, the stones being all well squared, and built together so as to constitute a complete system of break-joint, each stone being thoroughly cemented to its neighbour; whilst in the locality of the passages they are shaped to fit the accurate inner lining there introduced. And how clearly does the exposure of this inner and never-intended-to-be-weathered mass show the wisdom of the builders in selecting the material of the Mokattam hills for the original, and, by them devised, *perpetual*, exterior! For although the inner structure has been exposed to the effects of rain, sun, and wind for less even than 1,000 years, yet these atmospheric changes have so gnawed away and destroyed its primitive condition, that in many places great rents are exposed, and again under-surfaces laid bare; whereas the original casing of a material not sensibly harder, and which had been exposed on the Pyramid's sides to all the vicissitudes of climate extending over 3,000 years, to this day retains a surface nearly untouched—discoloured certainly, as a necessary chemical consequence resulting from the elements of which the substance is composed, but unaltered in the sharpness of angle and outline originally imparted.

The Second Pyramid of Jeezeh.

Let us then inquire as to the collateral features in the second pyramid

* In all cases where the ancient exterior coating, of whatever material that may have been, no longer remains, it is obvious that "present exterior," as in the Great Pyramid, really means *original interior* condition as finished by the builders.

of Jeezeh. This, the second in importance of pyramidal structures, is situated on the same hill of nummulitic limestone whereon the grander Pyramid sits, lying in a direction south-west of the latter. There can be no doubt about this having been covered partly in a similar manner to the Great Pyramid, as a very considerable portion of its topmost casing still hangs around, whilst that below is likewise robbed away. But this structure never had a complete casing of Mokattam stone, the two lowermost courses being of red granite, the huge blocks which formed it, when perfect, still remaining—some but slightly disturbed, others scattered about on the level plain which had been excavated to receive this second pyramid. “The Muslim spoilers of the years 800 and 900 A. D.,” says Piazzi Smyth,* “took the limestone and left the granite—just, in fact, as their Muslim successors do now; for they advance not, neither do they change; and day after day did we see camels from neighbouring villages loading up limestone blocks at the tombs around the pyramid, and dragging them off, but studiously avoiding the intractable granite,”—proof of this former ruthless theft being further extant in the fragmentary bits of the casing stones interlying the rubbish-heaps accumulated on all sides of its base. In the exterior of the two pyramids, then, there formerly existed some similarity; but the very introduction of the unmeaning granite base-courses of the second, distinctly show it to have had no oneness of design nor that simple purity of grandeur which attaches to the first. This, then, we may consider to be a first point indicative of a difference of purpose belonging to the two structures. Besides, how distinctly does not the mere introduction of what is certainly the more expensive and harder material indicate the ignorance of the builders as to the durability of the two substances! There can be little doubt but that the work of the Great Pyramid builder was intended to be handed down through ages in as perfect a state as the permanence of mundane materials and workmanship would admit; and therefore we should naturally expect that any man or set of men who had such wish in view should at once set about finding out the most likely substance with which to achieve their purpose. How perfect the knowledge in this point of durability of material must have been either to themselves or their leader, whoever that may have been, is apparent to any judge who has had the opportunity of examining the present condition of what remains of the Great Pyramid casing stones. Here we see clearly a mighty intelligence governing the work of the first Pyramid, and a wretchedly ignorant half-copyism of that noble work portrayed in the second: the first finished with a surface homogeneous, equally

* *Life and Work at the Great Pyramid*, vol. i., p. 207.

enduring throughout; the second finished with a casing partly homogeneous, but the remainder as discordant and equally unenduring, as proved by the decay and wasting away of the edges of the granite blocks forming the two lower tiers of casing stones, which remain to this day; whereas what is left of the upper part of the casing of the second structure still holds good its original form, wearing down but very slowly, and that without appreciable unevenness throughout.

But greater proof than what we have yet given shows absolutely the entire dissimilarity of the two structures. We had occasion to consider the character of the internal structure—that is to say, the present exterior of the Great Pyramid. Let us now look at that of the second; and what do we find it to be, but a poor, disorderly, altogether inferior mass of masons' work? It is described by Colonel Howard Vyse as “being only a kind of gigantic rubble work, so irregularly built, that since the removal of the casing, the desert sand and rain have penetrated in several places to a considerable distance; and it is owing to this looseness of construction that Signor Belzoni was unable to work his way through the stones, which had collapsed in the forced entrance, supposed to have been made by the Khaliphs; and that in 1837 the Arabs could not be employed in another part of it.” But it is worthy of remark that this inferior class of work extends to only a little above one-half in height of the whole structure, the upper part to which the casing stones still adhere being of a higher order, equal (I gather from the accounts of Piazzzi Smyth, who appears to be the only observer of this distinction) to the inner structure—that is, the present external surface of the Great Pyramid. It is most probable that he would not have discovered this more so than others, but for the recent falling off of a part of the interstitial coating of stonework, which exposed to view the inner structure. What greater architectural blunder, then, could have been committed than the placing of a thoroughly-tied-together breakjoint system of well-squared stone superstructure upon such an inferior basement? Thus far, then, I venture to believe I have completely proved, by the evidence of the present state of things at Jeezeh, that in the matter of present exterior there is no similarity between the great and second pyramids. Let us see how the comparison fares with the third.

Other Pyramidal Structures.

The third pyramid of Jeezeh is situated, again, to the south-west of the great and second, as well are the fourth, fifth, and sixth. There is good reason to believe it was built long after the second, and therefore after the first. It was partly cased in granite, only to a much

greater extent than the second—we learn, for at least half its height—and to this finish it is supposed to have had ascribed to it the name of “coloured pyramid.” It is considerably smaller than the two others which we have considered, being less than half the linear dimensions of the Great Pyramid. A great number of these granite casing blocks still remain in their original position, but are so much defaced and destroyed that they are of no value in enabling any exact determination of the original angle of side or exterior linear measures being obtained from them. We may pass over the smaller pyramids of Jeezeh, which are too insignificant to bear on the present inquiry at all, and have no reason to be compared with the Great Pyramid, as to the purpose of which this paper is mainly directed to explain. Continuing on about 12 miles southward of Cairo another group of pyramids—those of Sakkarah—make their appearance, being about 4 miles inwards from the west bank of the Nile; most conspicuous amongst which is that one which has long been called the “Pyramid of Steps,” so named from its present exterior appearance. The original base length, according to Perring, on the north and south sides, was 4,219 inches, and 4,627 inches on the east and west, whilst the present vertical height is 2,258 inches. The sides of this pyramid, too, are very far from being oriented as the Great Pyramid’s are, the north end of the east side being $4^{\circ} 35'$ east of true north. The present exterior of this pyramid shows a rather fine class of masonry; but as to its having ever been cased, like the Jeezeh pyramids, I do not possess information, although I think it probable that it was. As to the other pyramid, of Sakkarah, it is only necessary for me to draw attention to the low order of masonry which enters into its construction, as shown in the photograph, to prove that it is no contemporary work, or even approaching the high character of the Great Pyramid.

It is not, however, expedient for me to take up the time of this Society by continuing to make comparisons of this sort. I might carry them to much greater length; but I trust that it will be taken for granted, since it can be most clearly shown, that not another pyramidal structure in the world in any degree approaches the proportions—and I do not mean by this, mere linear dimensions—but the proportions of the parts, *inter se*, that obtains in the Great Pyramid. Long confessed to be *almost* the oldest, Dr. Lepsius, the greatest living hieroglyphic authority, has seen reasons for considering the Great Pyramid to be no longer “almost” but *absolutely* the oldest of all the Egyptian pyramids, and to have been reared up long before history was born into the world. There are other structures in Egypt, such as those of Dashoor, Abou-Roash, Meroë, and in other lands, which resemble it in form

somewhat, but not in symmetry, strength, or vastness. Not the tumuli of Asia Minor nor the Tauric Chersonese, as well as the so-called pyramids of America—not the tomb of Alyattes, nor the pyramid of Cholula, nor those in the Euphratean Valley,—and I will descend lower still to Sir James Y. Simpson's ridiculously-brought-up Irish tumuli, watch-towers, and defensive works,—are worthy of comparison.

The word "Pyramid," its Derivation and Meaning.

Sir James Y. Simpson calls into question the signification of the word pyramid, and endeavours to assert that its derivation is from two Coptic* words signifying the "king's sepulchre." We will, then, for

* At the time of writing my paper, that of Sir J. Y. Simpson's, read to the Royal Society of Edinburgh on Monday, January 20, 1868, had not been printed in full from its author's hands. All that I knew of it was what could be gathered from an unusually full report that appeared in the *Daily Review*, January 22. I have, since the reading of my paper, obtained that of Sir J. Y. Simpson's as printed in the Society's *Proceedings*; but do not find that I have occasion to retract one word of that which I had originally written; on the contrary, it is necessary to be even more precise in print than the time allowed for reading the paper admitted of.

In his opening paragraph (*Proc. Royal Soc., Ed., Vol. VI., No. 75, page 243*) Sir J. Y. Simpson remarks thus:—"After considering the many proposed derivations of the word pyramid, it was pointed out that the origin of the name suggested by the distinguished Egyptologist, Mr. Birch, from two Coptic words, 'pouro,' 'the king,' and 'emahu,' or 'maha,' 'tomb,' the two in combination signifying 'the king's tomb,' were *probably correct* [the italics are mine]. *Men*, in Coptic, signifies 'monument,' 'memorial;' and 'pouro-men,' or 'king's monument,' may possibly also be the *original* form of the word."

"Probably correct" is this inference to Sir James. Let us see if there is not some probability of its being incorrect. One thing is certain, that the absolute root of the word is lost; hence the number of proposed roots for it. Now, it is most singular that neither of the very learned gentlemen should have sought further back for the root of that word now called "pyramid," than a *Coptic* origin. And it remains yet for Sir James and Dr. Birch to explain what they really imply by "Coptic;" because by most persons it is supposed to refer to people of a vastly later day than those cotemporary with the Great Pyramid's erection. Modern Coptic may be altered from an older language, but is not the old language understood as Mizraitic from Menes downwards. Supposing, then, that the ordinary meaning of the word is implied, it is equally singular that Sir James admits (*Proc. Royal Soc., Ed., Vol. VI., page 245*) the Great Pyramid to be the oldest building in the world, by his believing in the discovery of Colonel Howard Vyse, that some of "the surfaces of some of the stones were found painted over in red ochre, or paint, with rudish hieroglyphics—being quarry marks written on the stones 4,000 years ago; and hence, perhaps, forming the *oldest* preserved writing in the world. Among these *accidental hieroglyphics* [perhaps the author of this sentence will yet explain in what sense they were accidental, when, on his own statement, they were 4,000 years old] Mr. Birch discovered two royal ovals—

a moment, go upon the supposition that this assumption of Sir James's, which he bases upon the authority of Baron Bunsen's arch-supporter, Dr. Birch, is correct; and supposing it is so, we are equally certain that the words themselves were obtained from the older Egyptians amongst whom we believe some of the meaning of the Great Pyramid was traditionally understood. But this does not at all indicate that the signification of the ancient word for pyramid had any reference to a sepulchre of any kind; and there certainly exist the gravest reasons, when we consider the passion of the Coptic race for a means, as they supposed, of preserving the souls of their rulers after death in the securest possible manner, that they should select as their sepulchral model an imitation of the strongest

viz., Shufu (the Cheops of Herodotus) and Nu-Shufu." Then if Sir J. Y. Simpson is content to inquire no further for the origin of the word than the date of incoming of what is generally understood to be the Coptic race,—for, be it remembered that, by assenting to date, he tacitly admits the Great Pyramid to have been built by the pre-Coptic or Mizraitic nation,—he must further allow that, previous to the Copts, the Pyramid was either a thing not understood, and therefore almost necessarily without a name, or if possessed of a name, that name itself signified the structure as a thing not understood; for, if of Coptic origin, the Copts themselves must have christened it "Pyramid." What a powerful lever against the entire "tombic" purpose of the Pyramid, as pronounced by Sir James, then underlies his entire argument! It is, however, well to pursue the other proofs against the entire tombic views that unavoidably herein grow up, and to state the fact, once for all, that long ages before the Copts were, the Pyramid was. In the day of its builder, to him at least its exalted purpose and symbolization may have been known—perhaps purposes (for the metrical theory does not object to a very large amount of sepulture having taken place within it). Still, "tombic" purposes do not explain its exquisite structure, its particular and accurately defined exterior and interior angles, its chambers resting on definite and unmistakeably numbered courses of the builded mass, nor a host of other portentous symbols; for nowhere else than in Lower Egypt is to be seen the pure, simple, and scientific form of a *pyramid* actual and proper. It tells a clear and mathematical story of itself, which never could have been read after the day when the nations fell into that degrading, graphic, and idolatrous religion, until now, when the western world, to some extent at least, has sought the fellowship of, and learned the lessons taught by seeking after, truth. Modern physical and geometric science has been so far developed as to enable some of its foremost masters to go forth and examine that mighty mass by the light which has in these latter days been thus afforded. The other so-called pyramids are uninterpretable by it: in them there is no shadow of science to be evolved. Truly "tombic" are they, full of frippery, and altogether the base insignia of some of the basest worldlings.

I may justly add here a most trite and fitting comment that has recently been made:—"Though we who do our duty as well as we can for the Pyramid may have our failings and make our mistakes, we are extraordinarily assisted by the huge blunders of such opponents."

and most enduring, as well as gigantic structure, that then existed, or that they could devise. Then, what could they propose to themselves as more fitting for such purpose than an imitation, as they supposed (without, of course, understanding the real meaning or symmetry), of the Great Pyramid? Hence it appears highly probable that the interpretation of the original word signifying pyramid had to the ancient Egyptians—the pre-Coptic race—a far different meaning than a “royal sepulchre;” and that through the gross degeneration of that people, the true signification of the word, and the true meaning of the structure itself, were lost; so that the Great Pyramid being imitated by the Copts as a burial-place for a king, they, no longer understanding the meaning of the word, used it to signify the king’s sepulchre. The next point that here suggests itself is, whether we have any means now extant for ascertaining the original signification of the original word for pyramid?

If the metrical purpose of the building shall yet be fully proved—and it must be remembered that scientific men are advanced to a great distance in this line of investigation—there are very striking reasons for applying originally a mathematical meaning to the word. The metrical theory shows, from strict and rigidly careful measurement, that the original vertical height of the Pyramid was to the length of two sides of its base as the diameter of a circle is to its circumference—or as

$$1 : \pi.$$

Now, in this sense, the Pyramid was originally a symbolization in the form of that one pyramidally-shaped solid which alone could represent the figure of the earth. From this I have deduced that the ancient word for “pyramid” signified, as one of the features expressed by it, that geometrical solid in which said proportion of height to base, or the mathematical quantity π , or the ratio of 1 to π , was embodied; and in this sense no other modernly-called pyramidally-shaped solid would be a pyramid at all, unless its height and base were in that exact ratio; and therefore the word really referred to that only one material standard known to exist anywhere; where those proportions could at any time be measured, either for mathematical or any other purpose whatever. Now, it is indeed most singular that our modern mathematical quantity π is the first letter of two Greek words,

περιφέρεια and *πυραμς*;

and it has, I believe, been generally supposed to be used to represent the ratio of a circumference of a circle to its diameter, because it is the beginning of the Greek word for periphery; but we may be equally certain

that some symbol for this must have been known long before the Greek π or *περιφέρεια* were invented, and which we know the Greeks got from the Egyptians, both of which were derived from the older Mizraitic language, and are to it a comparatively modern contrivance, and therefore merely represent to us under this metrical meaning that there was an older symbol and older word for pyramid used by the Great Pyramid architects, and fully understood by them in all its valuable mathematical meaning—both in a pure as well as practical sense.

It is in this restricted sense that I conceive the original meaning of the primal word for “pyramid;” although, since, in the ages of Egypt’s degeneracy, when she began to show up her idolatrous religion in that strangely graphic manner, the pure word was applied to signify so vain a structure for a purpose equally vain, it has since then by some men been used as a name for various geometrical solids, tapering from a base to an apex, of every conceivable degree of angle.

Is the Pyramid “Tombic” or Scientific?

It behoves us now to test the view I have thrown out by another consideration, for Sir James Simpson will not allow anything scientific to be bound up in the Great Pyramid, although he has strangely attempted to show that the people who were cotemporary with the period of its erection were quite well versed in “mining, architecture, and astronomy; and were so advanced, in various parts of the East, as to present no obstacle in the way of the erection of such a noble mausoleum as the Great Pyramid undoubtedly is.” In support of his tombic view he quotes the tale of the Arabian historian Ebn Abd Al Hokm, who, amongst some of his writings that have been handed down to us, says that when, about a thousand years ago, Khaliph Al Mamoon, in quest of treasure, tunnelled into the centre of the northern face, and by and by got into the king’s chamber, “he found towards the top of the chamber a hollow stone, in which there was a statue like a man, upon whom was a breastplate of gold set with jewels. Upon this breastplate was a sword of inestimable price, and at his head a carbuncle of the bigness of an egg, shining like the light of day, and upon whom were characters writ with a pen which no man understood—a description stating, down to the so-called ‘statue,’ or painted wrapper or cartonage, and the hieroglyphics upon the sere cloth, the arrangements now well known to belong to the higher class of Egyptian mummies.” It would be interesting to know if Sir James, at the time of reading his paper, was aware of the fact that there are several Arabian writers, of the same period as Ebn Abd Al Hokm, who make the Great Pyramid a scientific structure; and show that when

Al Mamoon broke into the king's chamber, he found nothing but the *empty* stone coffer; and who, for fear of the attack by his followers upon him after so fruitless an end, in quest, as it was thought, of treasure, directed his men "to sink a hole near the end of his excavation," wherein he hid a large sum of money, and which they at last came upon. But out of the many Arab historians who give as many different and discordant accounts, Sir James hits upon one who makes the pyramid "all-sepulchral;" but he did not tell us that there are many such Arab writers, each with a different story—many of them much nearer to Al Mamoon's age than was Al Hokm; yet not one of them is of the least authority on the originals of the Great Pyramid.

It is therefore necessary, to enable us to draw a fair estimate of the value of the author to whom Sir James has so unconditionally confided himself, to hear a little of what other writers of his country and about his time, as well as before, do really say. Let us then first take the account of

ABOU MA'SHER JA'FER BEN-MOHAMMED BALKHI, who died 884 A.D., and writes,—"The wise men previous to the flood, foreseeing an impending judgment from heaven, which would destroy every created being, built upon the tops of the mountains and in Upper Egypt many pyramids of stone, in order to have some refuge against the approaching calamity. Two of these buildings exceeded the rest in height. Upon the exterior of the building every charm and wonder of physic was inscribed in the Mosannad character, and likewise this declaration:—"I have built them, and whoever considers himself powerful, may try to destroy them; let him, however, reflect that to destroy is easier than to build."

MASOUDI, 967 A.D., says that "Surid Ben-Shaluk Ben-Sermuni Ben-Sermidun Ben Sedresun Ben-Sal, one of the kings of Egypt before the flood, built the two Great Pyramids (the Great Pyramid and second pyramid of Jeezeh). In the eastern Pyramid (or Great Pyramid) were inscribed the heavenly spheres, and figures representing the stars and planets in the form in which they were worshipped.

The king also deposited the instruments and the thuribula with which his forefathers had sacrificed to the stars, and also their writings, likewise the positions of the stars, and their circles, together with the history and chronicles of time past, of that which is to come, and of every future event which would take place in Egypt. He placed there also coloured basins (for lustration and sacrificial purposes), with pure water and other matters.

Says that Khaleef Haroun Raschid [others say, Al Mamoon] made a chasm in the Great Pyramid by means of fire, vinegar, iron instruments, and battering-engines; and having penetrated 20 cubits, he found a vessel filled with a thousand coins of the finest gold, each a dinar in weight; and the whole

* In a footnote (*Pyramids of Gizeh*, Colonel Howard Vyse, vol. ii., page 326), Dr. Sprenger, who had translated the Arabian account, makes the following significant comment, "Every writer, indeed, seems to have enumerated as many marvellous things as his imagination could suggest."

amounting to *exactly* the expense he had been at in excavating, he wondered thereat exceedingly.

ABOU ABD ALLAH MOHAMMED BEN ABDURAKIM ALKASI, died about 1187 A.D., says that "Al Mamoon opened the Great Pyramid, (820 A.D.)

"The author entered it and found a square chamber with a covered roof, and in it a well 10 cubits deep; whence at each angle doors opened into large apartments in which bodies had been deposited enveloped with many wrappers that had become black through length of time.

"He was informed that those who went there with Khaliph Al Mamoon came to a small passage containing the image of a man in green stone, and that when it was opened a human body was discovered in golden armour, decorated with precious stones: in his hand was a sword of inestimable value, and above his head a ruby the size of an egg, which shone like fire."

ABD ALLATIF, 1200 A.D., says,— "Many of my companions entered the opening into the Great Pyramid made by Khaliph Al Mamoon, and went up into the chamber constructed in the top of the Pyramid. Upon their return, they related the wonderful things they had seen, and that in the upper part were openings and windows which appear to have been made to admit air and light. When I again visited the pyramids I entered the passage with several people, but having penetrated about two-thirds into the interior, and having through fear completely lost my senses, I returned half dead.

"These pyramids are built of great stones about 10 to 20 cubits in length, and covered with ancient inscriptions in a language now unintelligible, as many inscriptions as would occupy 10,000 pages."

JEMAL ED DIN MOHAMMED AL WATWATI AL-KANINI AL WATWATI, 1340 A.D., states that "to the Great Pyramid there are seven entrances, each composed of one stone, and closed by one lock with such exactness that they cannot be forced open; that there are seven chambers dedicated to the seven planets, and in every chamber an idol of gold, with one hand upon the mouth, and with an inscription in Sind upon the forehead; that upon reading the inscription the idol opens its mouth and discloses a key which admits to various apartments."

EBN ABD AL HOKM, about 1438 A.D., repeats much of what Abou Abd Allah Mohammed Ben Abdurakim Alkasi said in 1187 A.D. about what he was told Al Mamoon did in 820 A.D. Considers that the pyramids were built by Sheddad Ben-Ad before the flood.

SHEHAB EDDIN AHMED BEN YAHYA, 1371 A.D., states,— "The Great Pyramid was opened by Al Mamoon, but nothing was discovered as to the motive or time of its construction. Each of the pyramids was consecrated to a star.

"The Sabæans performed regular pilgrimages to the great one, and also visited the others, which were less perfect.

"Every pyramid presents the form of a lantern. It begins at its base as an equilateral triangle, which diminishes as it rises, so that it is surrounded by equilateral sides. This form indicates that it was sacred to a star."

The foregoing are a few samples, out of a great many more which are too numerous to cite, of the Arab authorities for the Pyramid; and out of whom Sir J. Y. Simpson has, for what reason we fail to see,

selected and placed positive dependence upon, that one man in particular, who lived no less than 618 years after Al Mamoon forced his way. It is really idle to comment further upon the unfairness, nay, the absurdity, of the unlimited license which has been taken in making such a selection.*

* Whether Sir J. Y. Simpson had heard of my comments placed before the Glasgow Philosophical Society, concerning his choice of an authority (and which took place before the issue of that Number of the Royal Society's *Proceedings* which contained his paper) I know not, but there is reason to believe that he felt subsequent misgivings on this point, for at page 253 he endeavours to increase his stability by saying, in a footnote, that "It may be remarked," observes Colonel Vyse, "that the Arabian authors have given the same accounts of the pyramids, with little or no variation, for above a thousand years" (*Pyramids of Jeezeh*, Vol. II., page 328). Now, I beg to declare that Colonel Howard Vyse has never used any such words, either in the page quoted or anywhere else in the whole of his three volumes that I have been able to discover. The sentiment there expressed is, indeed, anything but his; for at page 179, Vol. II., he says, "The extreme antiquity of these remarkable monuments is evident from the uncertainty that attends their origin, and also from the *fabulous accounts given of them by Eastern writers, in which ignorance and superstition have so completely disguised tradition and facts, that it is scarcely possible to ascertain the foundations upon which they rest;*" and he sums up at page 366, Vol. II., thus,—"*Indeed, the only fact which seems to be established by the Eastern authors is the opening of the Great Pyramid by Al Mamoon, and even of that no distinct or rational account exists.*"

The quotation which Sir J. Y. Simpson has given is from a footnote to Masoudi, and with Dr. Sprenger's name attached to it. Masoudi lived about 130 years after Al Mamoon; yet Sir James uses it without even mentioning his name in connection with the Pyramid, or even mentioning the account of any other person, of finding a body like that described by Ebn Abd Al Hokm. Masoudi, indeed, gives one of the fullest accounts of any as to the scientific, astrological, medicinal, and cabalistic (with a very small proportionate amount of burying) nature of the pyramids and their fittings, and it is to that Dr. Sprenger is alluding, as what the Arabs have uniformly stated for 1,000 years; what they received from the Copts, and they again from the earlier Egyptians. It would have been as well had Sir James quoted the whole sentence. Indeed, it is notoriously clear that the foregoing is the view Dr. Sprenger is considering, from his footnote at page 326, *Colonel Vyse, Vol. II.*, and quoted above at page 18.

At a meeting of the Royal Society of Edinburgh, held April 21, an occasion when Professor Smyth alluded to the unwarrantable nature of Sir James Simpson's attack, the latter read an extract from a letter of Dr. Birch, purporting to give *his* opinion that Al Hokm died within thirty years of Al Mamoon. It is only right that Sir James should let the public generally know what Dr. Birch really did write, also *when* he wrote it. Even then it does not clear Sir James, because he quotes Al Hokm from Vyse and Sprenger, who certainly believed him to have been 600 years after Al Mamoon, and this report of a private letter is not of itself sufficient to overthrow the universally admitted authority of Vyse and Sprenger.

SIR GARDNER WILKINSON, in Murray's *Handbook to Egypt*, says,—“The authority of Arab writers is not always to be trusted; and it may be doubted whether the body of the king was really deposited in the sarcophagus (of the Great Pyramid).”

Happily, too, the metrical theory depends, as it was lately well expressed to me, “on no follower of a false prophet, or upon anything written by such deluded men 3,000 years and more after the Pyramid was built.”

But suppose we give full weight to the tale on which Sir James builds his attack, and admit that the Pyramid was used as a tomb, and it does seem extremely probable that those builders of the later tombic pyramids, the second, third, and so on, as well as those of Dashoor, Sakkarah, and elsewhere along the Egyptian valley, knew the manner of opening and closing of, and therefore the entrance into, the Great Pyramid—if they did not, it is difficult, seeing that they attempted to copy it in some other to them appropriate respects, in their tombic pyramids, to show for what reason they adopted a similar means of entrance into, and similar means of closing the passage leading to, their lower or sepulchral chambers. There can hardly exist any doubt but that the builders of some at least of the later pyramids were fully well aware of how to get into the first. We know, at least, the probabilities are very great that the pyramids had been opened before the time of the Arabs; and from Sir Gardner Wilkinson—a most safe authority—in his *Handbook to Egypt*, we learn, as further tending to confirm such belief, “that the Egyptians themselves had, in many instances, plundered the tombs of Thebes, and closed them up again.”

In the large folio usually termed *Perring's Plates of the Pyramids*, but got up and annotated really by Colonel Howard Vyse, the latter has clearly shown that he believes the pyramids were entered forcibly, but by the regular entrance passages, by the Egyptians, ages before the Arabs.

At page 2 of the second part of the above-mentioned work, it is remarked,—

“By whom the pyramids were first broken into will probably never be revealed; but as they were apparently entered by the regular passages, their interior construction must have been at that time known. It appears, likewise, that the Mahometan Caliphs, who, according to Arabian historians, made the forced passages, must have possessed, either by tradition or otherwise, some information respecting them.”

It will no doubt be universally admitted that, in regard to facts concerning Egyptian pyramids which are of that nature, the more generally observed and sought after, and the deductions capable of

being inferred therefrom, there never lived a man whose opinions are entitled to more respect than those of Colonel Howard Vyse. Unfortunate is it that he should not have been until the present time spared amongst us; for we may be sure that none more so than such an earnest investigator as he would have readily brought valuable aid in eking out the whole that yet underlies his own magnificent labours.

The breaking-in of the Egyptians mentioned in the sentence above-quoted was probably about 600 years B.C.,—and, let it not be forgotten, by Egyptians of a totally different faith to those of the Great Pyramid day; and such having happened unquestionably destroys any significance that may, on a *prima facie* view, be attachable to Al Hokm's report of Al Mamoon finding a body in the coffer of the King's chamber, supposing for the moment that he even did find it.*

Thus there indeed appears to be much strong evidence that these later pyramid builders, or some other people, operated in a very sepulchral way in the Great Pyramid; for we find the entrance-passage of the Great Pyramid continued beyond the point where it unites with the lower mouth of the well, and so far as we can learn, at the same angle as the upper part, but abruptly terminating in a very large, roughly hewn, and unfinished chamber, generally known as the "subterranean chamber." Now, it has occurred to me that the existence of this unfinished chamber is of itself evidence, by its very character, of not being the work of the builders of the Great Pyramid (*one of whose chief distinctions, everywhere in that structure so plainly marked, is the exquisite finish of their work, which obtains in no other known pyramidal building*), but that of a later, and inferior, and ruder race of men, who knew nothing of the high character or peculiar upper chambers of the Pyramid, but who pulled out the closing stones of the entrance-passage, and finding it abruptly ending at the point where it meets the well, as the hole is called through which the architects escaped, after lowering the portcullis and the closing stones of the ascending passage; being confounded, ignorant of, and unable to conceive at the real meaning of this order of things, it occurred to them that the Pyramid would make, according to their base and despicable creed, a splendid royal tomb—so they continued the excavation in the line of the entrance-passage, until, coming under the centre of the building, they there commenced enlarging it into a chamber for royal burial. But the very fact that this chamber exists in such an

* The reader should refer back to the quotations from Arab authors, and my comments thereon, at pages 18, 19, 20, and 21; also to the significant words of Sir Gardner Wilkinson, quoted at page 21.

unfinished state shows that these people were, by some cause, stopped short in their work,—very probably by finding out the bottom of the well, and by ascending which they reached the now-called King's chamber. This does, I think, appear extremely probable, and that these depredators, thus finding their way into the upper magnificent chamber, and seeing only the lidless stone coffer in it, thought to themselves, "Here is a fit sarcophagus and burial chamber indeed!" All this, no doubt, happened after the building of royal sepulchral pyramids had been begun in Egypt, for there is a striking analogy existing between the subterranean chamber of the Great Pyramid, and the subterranean, that is to say, tombic, chambers, which are the only chambers belonging to all the other pyramids which have been examined. There is part of an unfinished passage leading away from this subterranean chamber of the Great Pyramid, and we find similar passages leading to secondary chambers in those of the later pyramids, such as the second, as well as in the pyramid of Steps at Sakkarah.

The Coffer.

To advance beyond the mere speculation of probabilities, there exist far more cogent reasons for vindicating the correctness of the view which I have attempted to throw out—namely, the facts concerning the dimensions of the coffer in the King's chamber of the Great Pyramid; which some men have tried to show is merely a sarcophagus, and lastly, Sir James Y. Simpson declares it—although without showing one scrap of real evidence in favour of his view—no other than "an old, and somewhat misshapen, stone coffin."

We will now examine our facts, and see if they do in the least bear out Sir James's dogma. In the first place, then, this coffer is considerably larger inside than any other known Egyptian sarcophagus; its proportions are quite unique, the mean capacity of its hollow, as shown by four different modes of determining it, being 71,250 inches, whilst that of the sarcophagus in the second pyramid is only 66,410, or, according to Howard Vyse's numbers, 64,554; that of the third pyramid being still less, namely, 46,219; that of a large tomb near the Great Pyramid being 51,117; that of the fourth pyramid being 29,610; and the fifth, 39,775 cubic inches; and others are still smaller. The distribution of this superior capacity is still more peculiar in the coffer; for although it may have what might be termed a fair sarcophagus length and breadth, yet it has depth altogether unusual, extravagant, and useless for burying a man in,—a depth also which would prevent the decent and supposed usual arrangement of the sarcophagus being taken to its

place of final rest with its lid cemented and fixed on, as with coffins in the present day being conveyed from the house of the deceased to his grave.

Quite recently only has it been discovered, or at least recorded as a notable fact, that the coffer in the King's chamber had one most necessary character of an Egyptian sarcophagus belonging to the pyramid-building periods; and even this feature, which at first sight seems altogether for burial, and against a metrical theory, loses its force upon a closer and accurate examination. Before we can proceed to test this division of our inquiry, it is important for us to understand the manner of fixing the lids of Egyptian sarcophagi which belong to the Memphitic period. Thus,—one of the longitudinal top edges is quite cut away to a depth of from 1 to 2 inches, as shown in the drawings of sarcophagus of second pyramid, Plate I.; and at either end from this, two dovetail grooves are cut, with the top edge hanging over towards the centre of the sarcophagus, reaching from the lowered longitudinal edge to the opposite longitudinal edge, which is cut out in the same manner as the two sides. In this way a lid made to fit the grooves could be slid into place across the lowered longitudinal side, and when in place was quite firm, being prevented from being drawn back by certain drop pins which were fixed into blind holes on the under surface of the lid, and when pushed home the pins fell down a short distance, entering corresponding holes of sufficient depth in the lowered side of the sarcophagus. The lid itself is always very thick and strong. The question then arises, Does such an arrangement present itself in the coffer of the King's chamber in the Great Pyramid? I answer certainly not; for there never has been found, neither has any one—not even Sir James Y. Simpson's (to him infallible) author, Ebn Abd Al Hokm—ever seen or heard of a lid belonging to the coffer. All writers have concurred in that one report, that the only thing contained in the chamber was the empty vessel, termed variously by them as a “hollow stone,” “granite chest,” “lidless box,” “porphyry vase,” and so on. But upon a little closer examination than appears to have been usual with other examiners, it has lately been found * that this coffer is lowered on its west side by the depth of 1·72 inches, and that from this depression ledges proceed of equal depth along the northern and southern ends, joined again by a ledge of equal depth at the east longitudinal edge. Now this, at a *prima facie* view,

* By Piazzzi Smyth, *Life and Work*, Vol. I., pages 84 to 90; also Vol. II., pages 115 to 117; and Vol. III., pages 147 to 150. A slight notice of the coffer's ledge, but very erroneous, is found in *Perring's Plates of the Pyramids*, above-mentioned.

is a very sarcophagus-looking feature indeed, and, if examined no further, would, with some minds, completely upset the belief in the coffer being a metrical vessel. Yet of what nature are these ledges or grooves?—not dove-tailed, be it remembered, as in the sarcophagus of the second pyramid and elsewhere, and by which shape, or some slight modification of it, alone could the lid be retained in place at all!! but these recesses or ledges are rectangular; that is to say, the base is a horizontal plane and the sides are vertical, as shown in the drawings of the coffer, Plate III., the grooves being marked *a, a*, at figs. 3 and 4; for although the coffer is miserably chipped away and disfigured (see drawings of its present state, Plate III.), still quite enough of these grooves remain to show that they never were dovetailed, but rectangular, and therefore not “retaining grooves” in any respect whatever, not being capable of affording the least security in the way of holding a lid. But some will ask, then, How came these grooves here, and the holes for the drop-pins along the lowered western edge? I have before shown my reasons, based upon the unfinished state of the subterranean chamber, as affording strong grounds for believing that such chamber is not the work of the builders of the Great Pyramid, but that of some after race in the days of Egypt’s degeneracy, who, not knowing the real purpose of the Pyramid, set working to excavate a chamber for a royal sepulchre. Now, the very fact of the coffer presenting the appearance I have mentioned strongly tends to indicate that these men had found out an entrance by the well to the King’s chamber; and seeing the then perfect stone coffer there, determined to use it as a royal sarcophagus, as proof of which, these *begun*, but *unfinished* and *improperly-shaped* grooves. Then, further examination shows that they were either forced to stop this converting the coffer to such use, or, what is more probable, they found impossibilities in the way of using it, on account of its mere size, and mainly its extravagant height, which would not have allowed them to take it through a doorway, or down a passage, with a lid on.

The mean of several measurements of the height of the coffer, and making all corrections for probable extremely small amounts of error, is 41.17 inches outside, the maximum being 41.3 inches; and the mean height of doorway to the King’s chamber is only 42 inches. Now, in this case we find that the difference in mean height between the coffer and doorway is but 0.83 inches; this, added to the depression of the western side and ledge, would give a lid of only 2.55 inches thick, which is simply ridiculously out of proportion when compared with the mean thickness of the coffer’s sides, of 5.99 inches, or within $\frac{1}{100}$ th of 6 whole inches, and a thickness of bottom of 6.92 inches or nearly 7 inches. If

we examine the dimensions of the sarcophagus of the second pyramid, we find the lid to be 8·2 inches thick to the part cut out, and 9·8 inches elsewhere, whilst the mean thickness of the longitudinal sides is 7·6 inches, and that of the ends 9·35 inches, showing the lid thus to be much thicker—in fact, the heaviest part of the sarcophagus. Can there be any reason assigned—supposing the coffer for the moment a mere “coffin”—why such a weak and easily-broken-into lid should be used in the strongest, grandest, and noblest Pyramid too? Besides, mere heaviness of this very part was one of the chief elements of its security. To have used the coffer as a sarcophagus, we must allow it a lid at least as thick as that in the second pyramid, in which case its height with the lid in place becomes 49·37 inches, or indeed 7·37 inches, that is, close upon 8 whole inches, higher than the doorway entrance to the King's chamber. This, in a very simple way, shows that the coffer—no matter for what purpose intended, as a capacity measure, or some other thing—could never have been used as a good sarcophagus, according to the believed ordinary mode of fastening on the cover before entering the royal tomb. Then some modern architect or clever worker in stone will say, Surely those who attempted to convert the coffer for burial purposes could as easily have cut away the under side of the granite stone forming the roof of the doorway? This, at first sight, is a very feasible suggestion, and there are some indications that they thought the same, for we find at the entrance end of the doorway the granite roof stone cut away roughly for nearly 2 feet inwards, in the direction of the chamber, so that either it was found too difficult to cut away such stone, firmly fixed as it was, while the workmen had but such a confined space to work in,—and that, too, over a length of about 101 inches; or, what is more probable, that whilst this violation of the Pyramid was going on, some of those vast political changes between *North* and *South* populations and religions to which Egypt was subject took place, and so the spoiling was happily stopped; and we moderns—nevertheless the present ruinous condition—by the aid of modern science, have been enabled to revive the conception of what the Pyramid was, these spoilers not having been permitted to sweep the characters of the coffer and its original state quite out of the range of recognition. Again, there is another proof that the coffer is no pure sarcophagus, as the sarcophagi of the other pyramids and tombs are either sunk in the floor, with the upper surface of the lid a little above the floor surface, or, on the other hand, placed standing on the floor of a *subterranean* chamber; but here we see the coffer of the Great Pyramid never was sunk at all, but has always been standing upon a beautiful level floor of a most

stately finished and *upraised* room, of truly cut and finely polished granite, moveable about on such floor, but to this day scarcely shifted, in all probability, from its first-placed site.

Against the question of the capability of removing the coffer with a lid on, out of or into the Pyramid, structural proofs are abundant that, in the case of the Second Pyramid, the sarcophagus found there could never have been used in the believed ordinary manner of burying a Pyramid King. I am for the moment supposing the sarcophagus in Belzoni's chamber to be that in which royal interment did, or was intended to, take place. The proofs which exist that it never could have been so used are its own dimensions, and those of the entrance-passage, which show that, with the lid on, that sarcophagus never could have passed up or down that passage, because the passage's mean breadth is 41.65 inches, whereas the mean breadth of the sarcophagus is 41.8 inches, or 0.15 inches broader than the passage itself. The mean height of the entrance-passage, perpendicular to its plane of inclination, is 47.3 inches; but the coffer with the lid on is 46.2 inches high. These dimensions assert that if Nu-Shufu or any other ever was buried in this sarcophagus, he never could have been, according to what is usually accepted as having been the pyramid burial practice. Yet there is a way in which this sarcophagus would go down the passage—and the only way—namely, with the lid off, and turned over on its side, in which position there would be $(47.3 - 41.8 =) 5.5$ inches of space between the sarcophagus and the passage roof, and $(41.7 - 38.0 =) 3.7$ inches to spare between the sarcophagus and passage sides.

At first sight all this looks ugly, and disbelievers will exclaim, "Here is proof unmistakeable that the king's body was taken into the Pyramid in his shroud, his mummy exposed to the vile gaze of the enslaved multitude of subjects. Such being the case, why need we concern ourselves further about the question of capability of bringing the coffer out of or getting it into the Great Pyramid and King's chamber, when by this evidence it is certain that Cheop's body would and must have been similarly carried into the Great Pyramid?" Since opponents pretend to so much faith in historical accounts, let us see what history does say on this head of burial. And she asserts this, that in the case of the Second Pyramid, there is entire silence about any man's body ever having been buried therein, and there is no account of any ever having been found therein. History is equally silent, in any way that can in the least be trusted, about any man's body ever having been found, as placed by the original builders, in the Great Pyramid. Indeed, several of the earliest and most reliable writers

state—amongst them Diodorus Siculus—that “it happened neither of the kings who constructed them was buried in them; for the multitude, enraged at the sufferings endured in the building them, and at the many cruel and violent acts of the kings, threatened to pull their bodies in pieces, and tear them insultingly from the tomb.”

With regard to the Great Pyramid, Herodotus does tell us (he, too, of earlier date than Siculus) that Cheop's body lies deep down in a subterranean island, surrounded by Nile water (led thereto by a tunnel from the river); and there have recently been discovered certain special lines in the entrance-passage of the Pyramid which seem to point, amongst other things, to the spot where that tomb shall yet be found. Besides, what ground have we to think for a moment that, even if the enslaved populace did employ such a threat, they could carry it into effect?—as we know Nu-Shufu lived and reigned after his elder brother; so that, whether the two were co-regent or not, Colonel Vyse has acutely remarked, “If Cheops reigned fifty years, and had sufficient power to construct the Great Pyramid, it can scarcely be supposed that his body was not deposited within it, particularly as his successor is said to have reigned fifty years, and to have erected a similar tomb for himself, which he would scarcely have done had his predecessor's tomb been violated, or any doubt existed of the security of his own.” So that whether we trust the account of Siculus or that of Herodotus (and there can be no question about preferring either of them to Ebn Abd Al Hokm or any of his deluded countrymen), in either case we are equally sure, on the highest historical ground, that the coffer was not originally used as a sarcophagus for *Cheops*.

Discoveries in the Third Pyramid, however, have shed new light on the Great Pyramid; indeed, when rightly looked at, the more we examine it and others, so much the more do its exalted character and distinction grow up.

Turning then to the Third Pyramid: history does unmistakeably assert that a royal burial did therein take place,—and fragments of the very mummy case (an internal wooden box), with the very name declared by history found inscribed on it, as well as the regular burial sarcophagus (Plate IV.)—a grand affair of blue basalt, richly, deeply, and intricately carved in imitation of an Egyptian temple)—in which said mummy was contained—yea, some say the very bones of Mycerinus *

* *Some say* the bones of Mycerinus, and are still maintaining it in print. But the bones in question were wrapped up in garments of *wool*—a religiously *unclean* material in Egypt, and never on any account used by them for swathing an embalmed body, where they always employed linen. But *Arabs* use wool, and said remains are rather considered to belong to an Arab workman under

—have been found, and now lie in our own British Museum! But that sarcophagus is a very different thing from the coffer in the Great, and the stone box in the Second, Pyramid; a thing of dimensions more nearly proportioned to the size of a man; a thing capable of easily, and with its lid on and fixed fast, passing up or down the entrance-passage; alike in finish and other respects to some of the regular ornamental tomb sarcophagi; and placed, too, in a far-off, secret, low-down, closed-up, hidden, and little-to-be-suspected chamber—a chamber such as never has been found in the Second or Great Pyramid. And all the while this Third Pyramid, until the discovery of the real tomb, was notably similar to the Second Pyramid, in that its principal apartment contains a sarcophagus-hollow in the floor, similarly situated, and capable of receiving a stone box, firmly cemented into it, as in the second. Mr. Perring believed that in the Second Pyramid, if ever royal burial did take place therein, that neither the chamber within which that took place, nor the real royal sarcophagus, had been found. It is still a virgin discovery for whoever shall make it: and whilst we do know, on the best evidence, that the completest security of the body after death was the thing aimed at by the Egyptians, it really is hardly for a moment to be supposed that the royal mummy should have been deposited in a sarcophagus staring unmistakeably apparent in the floor of the first-reached apartment as you arrive straight thereto from the entrance-passage,—seeing, too, that the entrance to this pyramid appears to have been a thing well understood in Egypt. Besides, history tells us further that “the body of an inferior person “was often placed in the ostensible sepulchre, to prevent any further “inquiry after the principal tomb—as in the tomb of Amasis.” This arrangement evidently was intended to have been carried out, and not unlikely may have been carried out, in the Third Pyramid; because there the real sarcophagus was discovered and brought out of the real sepulchral chamber—a smaller stone box and more ornamented than the coffer in the Great, and sarcophagus of the Second, Pyramid—whereas in the chamber which is first entered, and which so well corresponds to the principal known apartment of the Second Pyramid, there exists in the floor of that chamber a hollow to receive a sarcophagus, nearly of equal dimensions to that in the Second Pyramid. In the Khaliphs, when they broke open that pyramid about 800 years ago. The body of Mycerinus was most probably found reduced to black dust, of which there was much inside the coffer—that being the usual result of the embalming by *spices* practised in the Old Empire of Egypt, according to William Osburn. It was only in the so-called New Empire of Thebes that the preservative powers of African *Natron* were discovered, and gave their mummies from that time forward a permanence they never had before.

the case, then, of the Third Pyramid, we find by our own comparatively modern discoveries that secular history is to be trusted; for the very contents which that history described as enclosed therein we have found contained in it. On this view, then, we must learn to show some respect to what the same writer tells us of burial practices, and in what way burial, if it ever did take place, was carried out in the two other principal pyramids; and I need not repeat what he says as to them.

Secular history, indeed, as well as the facts, are entirely against the alleged wholly tombic character of the coffer; and in this Third Pyramid we do find that the burial could have taken place by landing the sarcophagus easily down the entrance-passage into its far-off, secret, and difficult-to-find chamber; wherein, when landed, it was afterwards made as secure as possible by ramps and blocks laid upon them in the passage leading thereto, and which Colonel Howard Vyse took out to bring the sarcophagus out of the pyramid.

But, then, modern science can well afford to make a present to the disbelievers—the so-called “advanced thinkers” of the present day—of all that secular history says; and she can also afford to let such ignorers of truth bring up all they can find in history, or by other appeal that such men can make to any of their oracles, while she alone applies herself—to what?—the facts; when, lo, the wondrous tale she unfolds! and exhibits herself as that which she is, and must, in that day when the chaff shall be separated from the wheat, prove to be—the hand-maid of sacred history—the confirmer and expounder of much Scriptural truth. The day inevitably will come when both shall be found to agree; and never have the two made such approach before as of late, when the most apt masters of science have applied it to that “sign and wonder in the land of Egypt”—until now, to mankind a thing not understood, truly a stumbling-block to those who will not listen to its own portentous unfoldings—to those men who, despising sacred history, pretend to dictate what they consider “the reasons which experience and so-called judgment teaches,” and who actually presume to define what ought to be the contents of the sacred volume of Inspiration—according to their ideas of what the Divine Spirit ought to do; and who, on reading, desire to be addressed with, not “What readest thou?” but “What thinkest thou?”

In all humbleness, we ask these men to apply science to the second, or third, or fourth, or any other of the things they call, pyramids, whether in Egypt, Ethiopia, America, or Ireland, perhaps Great Britain, or elsewhere, and let them show us in any one of them even a very rough approximation to an important mathematical

quantity being involved. This they cannot do. And let Sir James Y. Simpson, or any of his school, explain in any other way they can the meaning of the special lines and angles of the Great Pyramid; let him show us what purpose the two masonry tubes leading from the King's chamber, if not for ventilation, were to serve; let him tell us, too, why that chamber is situated in the *fiftieth* course of masonry, except for again indicating an unquestionable symbolic number in the Pyramid, so oft repeated; then let him show why that despised vessel is so formed of unmistakeable proportions—these proportions indicating, amongst other things, the close approach to exactness made by man's recent researches into one of the most remarkable quantities in the whole range of physics; and let him point out any other means which will indicate so *correctly* the true distance of the earth from the sun, as the Pyramid's height does. If Sir James would apply himself to the real facts, he could then see the poverty and smallness of his attempt, for which he could never then have had occasion, to divide a great cosmical standard by the unit best known in his own language, as the "brim of his own hat."

It is, however, mere waste of time to continue in this strain, for the whole answer to the coffer difficulty, as it was formerly expressed in regard to the whole Pyramid, is, that it tells a clear and mathematical story for itself, which a vessel of no other dimensions or proportions could, and we are contented to stand our ground until the time when the other Great Pyramid symbols, which have of late been so largely developed, shall all unite in forming that "circle of science" which in it is undoubtedly bound up.

To take another view, the question arises—Does the coffer contain any proofs of definite metrical design? Of itself it answers, Yes, unhesitatingly! Although Sir James declares that because it has turned out to be a vessel not truly rectangular in form—simply because it is not, as he terms it, "of pure mathematical form"—he makes off to the conclusion, that its *sole* end and aim was a coffin, and nothing but a coffin, for the dead body of a man. Did he, however, ever attempt to inquire whether its apparent irregularities are not really *adjustments of figure*, made purposely—designedly made—to cause that vessel to conform to its constructor's intended metrical ends? What then if we prove by actual measurements that the alleged irregularities are positively no other than such adjustments; also, if we show, out of a certain set of these roughly handled irregularities, that they were so made to typify one of the grand mathematical features represented by the linear dimensions of the whole Pyramid? But this you cannot do, says the scoffer at realities!

Restoring the coffer to its original finished state, we find, by four different modes of determining the capacity, that the mean comes out 71,250 cubic inches almost exactly*—this round number being exactly that which theory indicates, and founded upon a most important element of our cosmical system. Then this is twice repeated, because it has been again found, by reducing the apparent irregularities of figure to their mean, that the mass of material constituting the original coffer's sides and bottom is also 71,250 cubic inches nearly; that is to say, the solid block of granite which would fill the coffer's capacity of hollow is of equal weight to the quantity of material forming the sides, ends, and bottom together. This, however, the disbelievers call "an accident," and they say that the coffer ought to have been made of equal length and breadth on its opposite sides; but holding, as the supporters of the metrical design do, that the one measure of the capacity of the hollow was intended by the constructor to also represent the cubic contents of the vessel itself, there is no difficulty in seeing that if the coffer sides had both been made equal to the maximum length of the east side, the solid contents of the vessel itself would have been larger than the solid contents of the hollow, and, on the other hand, if made equal to the smaller length of the western side, the solid contents would have been less than would fill the hollow. But the scoffer again says, the vessel could have been made with its opposite sides equal and parallel so as to constitute a rectangular vessel, and why were they so horridly misshapen? I answer, because, amongst other features, a certain significant symbol was intended to be typified by that vessel, and the maximum dimensions were absolutely necessary to produce that symbol, for, with the coffer's height, no other length

* MEAN DIMENSIONS OF THE COFFER OF THE GREAT PYRAMID, IN PYRAMID INCHES (THE LEDGE AND BREAKAGES BEING ELIMINATED).

	Length.	Breadth.	Depth.		Cubic Con- tents in Cubic Pyr. Inches.	
1. Inside, . .	77·85	26·70	34·31	Product —	= 71 317	
2. Outside, . .	89·62	38·61	41·13	Product ÷ 2 =	71 160	
3. {Floor, . .	89·62	38·61	6·866	= 23758}	= 71 266	
{Sides, . .	2(89·62 + 26·70) × 34·31 × 5·922 = 47508					
4. { Inside by a 2nd method, }	77·85 × 26·70 × 34·282			=	71 258	
					Mean =	<u>71 250</u>

N.B.—The thicknesses are obtained partly from direct measures thereof, in *Life and Work*, and partly by difference of the inside and outside measures given above.

and breadth but the maximum given by the bottom of the east side and north end would produce it.

The maximum length of the bottom of east side of the coffer is	90.5 inches.
Maximum breadth of north end at the bottom is	39.2 „
Maximum height at north-east corner,	41.3 „

It has been shown that the sum of the lengths of two sides of the base of the Pyramid is to its height as the circumference of a circle is to its diameter—or the ratio always represented by π ; now, then, in the case of the coffer, we find

$$\frac{90.5 + 39.2}{41.3} = 3.1405 = \pi \text{ true within } - 0.0011.$$

Thus, by taking the *exactly corresponding sets* of dimensions in the coffer, which John Taylor first took for the whole Pyramid, we evolve the same mathematical symbol, π .

Here we see the modern measures of the coffer give π more closely than the modern measures of the Pyramid, not certainly because of greater residual amounts of error existing in that structure; but because the measures of the Pyramid itself are excessively rude and uncertain when compared to the precise treatment of accurate measure which the coffer itself has received.*

Further, we see that it was a necessity to make the coffer of irregular figure, for if not to contain the one metrical feature, it could not, if regular, have contained the other; but it contains other important metrical features still, which, together with the two preceding, could not have been included in what Sir J. Y. Simpson calls a “mathematical vessel.” Strange is it that quite recently, when measuring up the solid contents of the coffer, Piazzzi Smyth found that the volume of the coffer’s bottom is one half of the coffer’s volume of sides and ends: this could not have been effected with the other two metrical features before-mentioned in a very evenly formed vessel. Then, again, the solid contents of the mass which would fill the coffer’s hollow—or, in other words, when the coffer is the very peculiarly proportioned vessel it is,

* The conviction that π was symbolized in the coffer originated itself with me about three years ago; but at that time I could not prove it with sufficient closeness, from the want of proper coffer measures. Since then, however, the real coffer dimensions have been published to the world by Piazzzi Smyth, and it was only on a recent occasion, when going over these, my former conviction was recollected; and on applying it, I had the pleasure of finding it to be true. This, indeed, goes far to prove the faithfulness of those measures last brought home from Egypt.

the volume of the whole material forming the coffer itself—divides the cubical contents enclosed by the lower adjusted course of masonry of the King's chamber fifty times; and this chamber stands upon the *fiftieth* course of masonry of the whole Pyramid. Could all these exact metrical features occur by accidents? And are not their occurrence proofs of design? Nay, do not the scoffed-at and so-called irregularities prove themselves as purposely-made adjustments, and of necessity, to cause that vessel to conform to all the metrical features it is found to contain.

Does not the fact of the coffer's cubic contents dividing the contents of a special wall-course of the King's chamber exactly fifty times, prove that the coffer was made for that chamber. Equally, then, does the occurrence of π both in the coffer as well as the Pyramid show that *that* vessel was made for *that* Pyramid; and astonishing is not the design which secures *that* in so simple a vessel, and yet does not lose the other symbols? And when we further find that the dimensions of such vessel are founded upon the highest natural and most unvarying standard of linear measure that our cosmical system contains, pointing, too, to that most difficultly-to-be obtained quantity, "the earth's mean density," man surely should beware ere he begins to scoff and jeer at that which shows itself altogether of so pure, exalted, and complete a character.

To conclude this division of my subject, I have not the least hesitation in avowing, that if any honest-minded person will simply put away prejudice or previous notions, and make a fair comparison upon all the points which from time to time have been brought together on this question, he will conclude, as others in these latter days have done, that not only is the coffer no "mere sarcophagus," but that indeed the Great Pyramid, when rightly looked at, in its ancient perfect splendour, as separate and distinct from other so-called pyramidal structures, cannot be explained solely from a tombic point of view. I could even yet add further proof than what has already been given, but it is utterly hopeless to exhaust simply one feature of so vast a subject, in a single paper. So that, without touching further here upon the peculiar proportions and metrical features of this vessel, I hope to have shown abundantly that the coffer was originally some other thing than the "old, and somewhat mis-shapen, stone coffin" which Sir James Y. Simpson asserts. I pass on to a few other considerations.

Miscellaneous Comments.

It is very singular that this modern most-laboriously-worked-out metrical theory has been attacked by only two men—men certainly

and justly celebrated in some respects;—these are, Col. Sir Henry James, and, as I have before mentioned, Sir James Y. Simpson. The great difficulty one feels in replying to Sir James Simpson's attack is the ascertaining of how far it is meant by him to be seriously taken, or whether it should be looked at in large amount as mere joking, for of this latter character much of it appears to be. "His mode," as it has been described by a civil engineer in London, "of representing the coffer's condition; his complaints of the errors of modern measures, as a charge against the Pyramid; his complaint of (what is just the token of design in the coffer) its unamenableness to linear measurement; and his complaint, that if linear measure were intended, the intended standard would be repeated many times all over the coffer and Pyramid, whereas it is considered by scientific men to be important *not* to repeat a standard more often than is necessary, in order to avoid either excessive error in making them identical, or else confusion from their casual differences. Again, he takes the *admitted* limits of error in modern imperfect measures of base lengths and angles, &c., and pretends that all men are agreed that these are not errors of measurement indeed, but original variations in the Pyramid. Surely all this is mere joking. He cannot expect it to be seriously replied to by any scientific or busy man. He also picks out little mistakes, such as those of arithmetic, and even of printing—mistakes made here and there by the two or three great investigators who have elaborated the metrical theory; mistakes here and there, amid many other striking things in which there is no mistake; and mistakes which, when rectified, show the shrewdly-guessed idea in a still stronger light. Of these, we may take, for example, his comments on the coffer capacity, the Inglis base measure, the commensurability of pyramid weight with earth weight, of which the more perfect calculation only proves the comparison more perfectly. He calls up such mistakes as if the leading outline of the theory had no other supports, and as proofs of its whole fallibility; but, we may justly ask, are not such mistakes usually committed by most advocates of a new and deep theory? Such is merely and unavoidably what has been abundantly seen in all scientific progress, and is so common as not to be considered by its friends as any disgrace."

I may remind you of some mistaken arguments and data (ridiculously mistaken) raised in defence of, or in constructing some theories, which are, nevertheless, firmly held on other and independent grounds. Need I allude to whole pages of grave print and earnest argument, based on arrow-heads of flint, afterwards found to be forgeries; or on a stratum of Nile mud at least 20,000 years old, as sure as modern science

exists, but in which a bit of *very modern* pottery was unfortunately discovered after all the arguments had been so nicely made out; or similar awkward mistakes discovered in caves; or to the mistakes in the best-known (so certain persons confidently say) facts in crystallography and chemistry, but which we are one day told point with absolute certainty to the igneous origin of granite, and another day to the aqueous origin of it;* or need I refer to the metrical theory, which was once said to be established and proved, as indicated by the wonderful carved tablet found in excavating a sepulchral mound within the limits of the modern city of Cincinnatti, the series of lines on which were discovered to yield, in the sum of the products of the longer and shorter ones, a near approximation to the number of days in the year—a result which has been considered sufficient to ascribe to the tablet an astronomical origin, and so constituting it an ancient calendar, recording the approximation of the mound builders to the true length of the solar year. This wonderful tablet, too, has been shown to contain some other astonishing coincidences, until a metrical theory has been made out for it, and yet to a great extent received by mankind—perhaps by Sir James Simpson, or at least with which we have not heard that he finds fault. Nevertheless, because the Great Pyramid contains endless coincidences which point to the completeness of its metrical character, it is most unmercifully handled and most recklessly pawed.

It is, however, really idle for me to take up time in discussing more of the objections than I have already noticed. We must remember that the Pyramid was built in the symbolic age of the world, at a time when the actions of men were ordered by symbol, and is therefore not a directly legible expression, but legible only by its own peculiar symbols; which, when rightly and fully understood, show it clearly to be a gigantic formula, an equation capable of solving numerous metrical questions that may occur in the ordinary routine of human transactions and requirements, both in a domestic, commercial, as well as cosmical sense. How these solutions may be effected I have not time this evening to show; but I would strongly recommend those who feel an inkling towards the truth in the Great Pyramid, to examine with an unbiassed state of mind the various writers who have touched the subject.

One more point as to Sir James Y. Simpson's *dicta*, and I have done with them. Sir James, in a certain work from his pen not long since, asserts that "from the earliest historic periods in the architecture of Egypt, Assyria, Greece, and down to our own days, circles, single or

* The substance of these latter comments is abridged from a letter written by William Petrie shortly after he had read the Report in the *Daily Review* of the onset made before the Edinburgh Royal Society.

double, and spirals, have formed, under various modifications, perhaps the most common fundamental types of lapidary decoration." Now, from such an assertion we should expect to find some such decoration in or about the Great Pyramid, believing it, on unquestionable evidence, to be the oldest building on the face of the earth; but most assuredly there is no such decoration in that vast pile—not a shadow even of such a thing. One little something or other there is certainly in one hitherto not yet completely explained part of the structure,—a little semiovoid chamfered projection on the northern face of the granite leaf in the antechamber leading to the King's chamber. Neither the use of this little projection nor its symbolic meaning is yet understood. At first sight it looks as if intended to constitute a projection by which the leaf might be laid hold of for being lifted, and in this sense is like projections on some Egyptian sarcophagi; but then this leaf is firmly cemented in its place, and cannot be so lifted.

Conclusion.

I may, in conclusion, bring before you one or two points which bear on this metrical theory. In the first place, the mean angle of the sides, as shown by the more careful measurements of the casing stone angles, and deduced from the present exterior flanks of the Pyramid, is between $51^{\circ} 39'$, $51^{\circ} 59'$ and between $51^{\circ} 49'$ and $51^{\circ} 58'$, the mean of which is close upon the angle necessary for the construction of a π pyramid (namely, $51^{\circ} 51' 14.3''$). But what does this peculiar angle produce? It produces in the Pyramid a most celebrated and, in such a structure, remarkable ratio, and which no other angle could produce in such a figure—the ratio of the diameter of a circle to its circumference—the mathematical quantity π . And the more remarkable feature is, that a π pyramid contains this ratio in two perfectly distinct and clear representations, each one depending on the other, and each being the direct result of the angle $51^{\circ} 51' 14.3''$. The original quantity used by John Taylor for the vertical height of the Great Pyramid, as deduced from the angle of sides combined with length of base, and partly tested by direct height measures by Howard Vyse, comes out 5,832 inches = 486 feet; whilst the distance apart of the corner sockets, as ascertained by direct linear measurements over the intervening rubbish heaps, is 9,168 inches = 764 feet.* Now

$$486 : 2 \times 764 :: 1 : 3.144; \text{ or as } \frac{1}{\pi}.$$

* It is exceedingly probable that whenever the true linear measure of the base is ascertained (to enable which to be accurately effected, the platform must be cleared of its rubbish), the length will come out slightly greater and produce π still more true than is obtained from the measures we now possess.

To get this ratio from the Pyramid, we have to perform a multiplication which does not take place in the expression for the ratio of the diameter of a circle to its circumference; that is to say, we have to multiply one base side—namely, 764 feet by 2; or in other words, we have to add together the lengths of two sides of the base before that ratio can be found. And even then, the ratio so got has not a finite look about it, because, in taking two base lengths, we only take the half of a whole quantity—that is, the half of the sum of the whole four sides of the base; for we must consider the lengths of the four rectangular base sides a whole quantity, just as we consider the circumference of a circle to be so. Since John Taylor's discovery, Piazzzi Smyth has used the sum of the lengths of the four base sides as a whole quantity, which bears to the Pyramid's height the same ratio as a circle's circumference to its radius, or $\frac{2\pi}{1}$.

These considerations led me to look for a more finite and complete expression of this π ratio without requiring any such multiplication, or without taking any half or part of what appears to be a whole or complete quantity by itself. I was not long, then, in seeing that the meridian area of a π pyramid is to its base area as 1 : π in a direct manner, without requiring any doubling or halving whatever. We have, then, this remarkable ratio twice embodied in the mass of the Pyramid. Again, the base length is shown to be commensurable with that most unvarying, and to us important linear feature of our cosmical system—namely, the earth's polar axis, which, as we learn from the Ordnance Survey, according to the two methods for computing arc-surveys adopted, comes out, according to one method, 500,482,296 British inches, and by the other, 500,522,904 British inches—the mean value of which is 500,502,600 inches, or close upon 500,500,000. Now, Mr. Taylor has shown, and Sir John Herschel confirms, in his *Essay on the Mètre*, that the present British inch is very nearly the 500,000,000th part of the earth's polar axis; and that if it be made only 1,000th part longer, it would place our linear measure on a perfectly faultless basis. One of the grandest points, then, which the metrical theory discloses, by numerous unmistakeable coincidences, always coming out within extremely small limits of error, is that the Pyramid builders designed their work in accordance with an unit which is strikingly commensurable with this most unvarying and therefore most exalted standard; for we find that the base length of the Pyramid, as deduced from one source, comes out 9,142 inches, which being divided by 25.03, being the 10,000,000th part of the earth's polar semidiameter, gives 365.25 nearly, or the nearest whole number for the

days in the solar year. It is extremely probable that the value of the solar year in measure of earth rotations will come out more exactly than the remarkably close quantity yet obtained, as there are weighty reasons for believing that this mean, 9,142 inches, is something short of the real base measure, which cannot be obtained correctly—that is to say, within the smallest possible limits of error—until the platform on which the Pyramid stands is cleared of the overlying mounds of *débris* there accumulated: and therefore, as before explained, such determinations as those hitherto made must always be different from the real dimensions by the amount of residual error belonging to each such attempt at mensuration under impossible circumstances for accuracy. And when we further consider that the French Academicians in 1799 give the base length as 9,163 British inches, Col. Howard Vyse as 9,168, and Mahmoud Bey as 9,162, we get another mean giving a result close to the days in the sidereal year—namely, 366.18; so that out of the various base lengths it is left to the Pyramid itself to decide which is the true one, and certainly its symbolical system does point out that one or other of the two means now taken are very near the true base length. Here, then, we find embodied in the Pyramid—in a symbolic way, most truly, but in such a way that the curators of a metrical system could at any time make themselves sure about—the first great element of time-measure,—that element over which the French legislators in succession so grossly stumbled when they wanted to divide everything by tens, but found in the end that the unalterable time standard could not and would not be so decimalized. From this as a starting-point in time-measures, then, nearly every other subdivision of time into lunations and weeks, and so on, has of late been shown to be embodied by oft-repeated and most astonishing coincidences, in a way that cannot but impress studious minds in search of truth. That the reasons are grave indeed, and most highly suggestive of the belief that the Great Pyramid—so noble and pure a work, undefiled by any idolatry whatever—is, in chief part (included in a yet more significant design), a vast metrological monument, replete with symbols for the true guidance of man in dealing and conducting all those affairs of his nature wherein number and quantity or measure are concerned; in brief, the coffer, as well as the King's chamber, are plainly symbolic of capacity-measure, and, as dependent thereon, weight-measure also, each of which are founded on the linear measure already laid down for the Pyramid, combined with a reference to the earth's bulk and specific gravity. The present state of science shows so clearly that now is the time when the Pyramid is to be read aright by those who will attend to its most

convincing, ever-recurring coincidences, pointing so unmistakeably to such a series of mathematical and cosmical facts, besides other things, that if its original purpose, in one respect at least, was not a grand material embodiment of a pure system of metrology, based upon the purest and most unvarying standard in nature, let that man come forward who is able to prove what else it is!!

THE SUN'S DISTANCE AND THE GREAT PYRAMID.

By W. PETRIE.

Communicated to the Philosophical Society through ST. JOHN V. DAY.

MODERN science has found the mean distance of the sun to be one of the most difficult determinations, as also it is one of the greatest and most important. Nothing less refined than the best modern mathematics and instruments can determine it with anything like scientific accuracy; and even then the error has been, within the last ten years, about 500 times as great (in proportion to the whole distance) as the errors have been in other scientific determinations, such as the diameter of the earth.

The Great Pyramid gives this sun-distance with an accuracy which there is strong reason to believe is as perfect as can be expressed by dimensions in masonry.

One proof of this,—the most plain and practical proof,—that the continually improved results of astronomers during the last 120 years, since they found out anything about it, have continually come nearer to what the Great Pyramid fixes as its distance, thus—

	British miles.
In 1750 astronomers made it,	82,000,000
Early in the present century,	95,000,000
About 1860,	91,678,000
In 1867 the last and best result, by a re-computation from many former observations, but with better elements, Simon Newcomb, the American astronomer, makes the distance	92,380,000

He determined this without knowing that the distance had been inferred from the Great Pyramid, in course of its being studied in England just previously in the same year, although this result was not published until after he had published his; and this Pyramid datum for the distance of the sun is 92,093,000 miles.

Modern science will not have another opportunity of trying its skill in rivalry with the Great Pyramid wisdom of primeval time (doubtless by original revelation) until the year 1882, when there will be a good transit of Venus: there will be an inferior one in 1874, not suited to give an accurate result.

The following is a brief outline of that portion of the pyramid evidence that relates to the mean distance of the sun:—

The mean distance of the sun is $10^9 \times$ pyramid altitude; that is, 1,000,000,000 times the length of the vertical axis or perpendicular height of the Great Pyramid, from its original pavement up to its original peak.

A.—Because all parts of the Pyramid constitute together a connected system of symbols relating to one primary subject. This symbol system requires, as part thereof, that the vertical height should represent the solar ray, or mean distance to the earth [and that, too, by functions of 10 and 9], so distinctly, that this was discovered not in the course of guessing, or random search for coincidences with Pyramid quantities, but by a steady process of inductive investigation of that most vital element in the Great Pyramid (its system of symbols), wherein a probability of its showing the sun's distance, as well as the mode of it, was presented (to the writer's mind) unsought, and in the form of an unavoidable corollary to the system of symbology; and this before the last and best datum of sun-distance by Simon Newcomb had been known or calculated.

B.—Because this Pyramid, by tradition and history, has pre-eminently reference to sun and earth.

C.—Because the precise solar distance thus indicated by the Great Pyramid is the very distance that agrees best, on the whole, with all the more or less varying and uncertain determinations of the true distance which modern astronomers have made from time to time.

THE PYRAMID ALTITUDE.

The foregoing explanation depends on the altitude of the Pyramid being exactly known. We must explain that this is determined by the breadth of the base, which remains marked in the foundation rock, and by the angle of the original casing-stones, which has been exactly discovered by theory and measurement to have been such that the height is exactly the radius belonging to a circle of such a circumference as equals the length of the base, measured round all four sides; or suppose a string exactly long enough to be stretched around the sides of the square base of the Pyramid, and then this string spread out

on a flat piece of ground so as to be in a circle, instead of a square form, the radius of that circle, set upright, would be the height of the Pyramid. This height is 5,835 British inches.

THE BASE BREADTH

Is determined by the weighted mean of the careful measurement of the French Academicians, with the most perfect instruments that were then known, and the measurement of Colonel Howard Vyse, which were found in other places to be very correct. This mean is 9,165.59 British inches.

There are also other considerations, which cannot here be entered on, which determine this matter to be exactly the same as the above mean measurement.

That a structure, executed at so great a cost, and such as would be in many ways the greatest triumph for human labour, skill, and science, should be made ostentatiously devoid of inscription, or of any other mode of recording any man's exaltation, is itself a strong corroboration of its design having been given by supernatural command, like that of the ark, the tabernacle, and temple of Jerusalem; for it is quite contrary to what we know of human nature, and more particularly contrary to the ways of men in such times and places, as it is emphatically testified by the adjacent catacombs, that so magnificent, so unparalleled, and eminently warrantable an opportunity should not be taken for exalting man, and especially the originator, owner, and ruler of the work, and that by aid of inscriptions, if he were a mere man.

The above-named peculiarity reminds us, not of any of the great humanly-devised structures, from the Pyramids themselves to St. Paul's Cathedral, London (though devoted to God), replete with inscriptive exaltations of man; but in this respect the Great Pyramid reminds us of the divinely-commanded temple at Jerusalem, to the one God over all.

APPENDIX.

Notes on Structures called Pyramids.

SINCE the foregoing paper was read to the Philosophical Society, it has been represented to me, as advantageous to the subject, to supplement it with some considerations on other structures which some persons have called pyramids. The following notes, and accompanying wood, as well as plate, engravings of a few examples of such structures, have been put together in the hope of tending, to some extent, to remove a cause of much confusion to latter-day readers. There can be no question that the mischief which has been produced by such an universal application of one term to numerous varieties of structures, originally raised for as many different purposes, is the cause of much of that unhappy dogmatism which now-a-days exists, in persisting to say that the Great Pyramid is nothing else than a tomb. An idea and belief solely tombic having got possession of the minds of most readers, being what they were taught by people of the passing generation, in whose day the definite metrical peculiarities, and therefore realities, of the Pyramid were unknown, is naturally and persistently held, simply because so comparatively few minds have yet the courage to make the beginning to try and examine if there is not a greater foundation of reality in what the most refined applications of science have since their school-days discovered, than in what they were then taught: yet, whilst a solely tombic theory has nothing convincing about it, because there is nothing to prove it; yet the metrical (shall we say *symbolic*?) theory, because it is of recent birth, and does contain endless series of unmistakeable symbols pointing to such high and lofty ends, and requiring efforts of a loftier order than hitherto considered necessary to understand the Pyramid, half the world is afraid to give itself the exertion of really ascertaining what the metrical features are; and because they have not courage to do so, such persons presume to condemn those who have sought to understand its exquisite symmetry and purity; nay, they even condemn the mighty structure itself.

I shall not enter into any descriptive statement as to the Great Pyramid, nor of any of the Jeezeh Pyramids, because all this is so excellently done in a collected and easily accessible way elsewhere.

The accompanying woodcut (Fig. 1) will, however, demonstrate one feature peculiar to the Jeezeh group—namely, their universal similarity

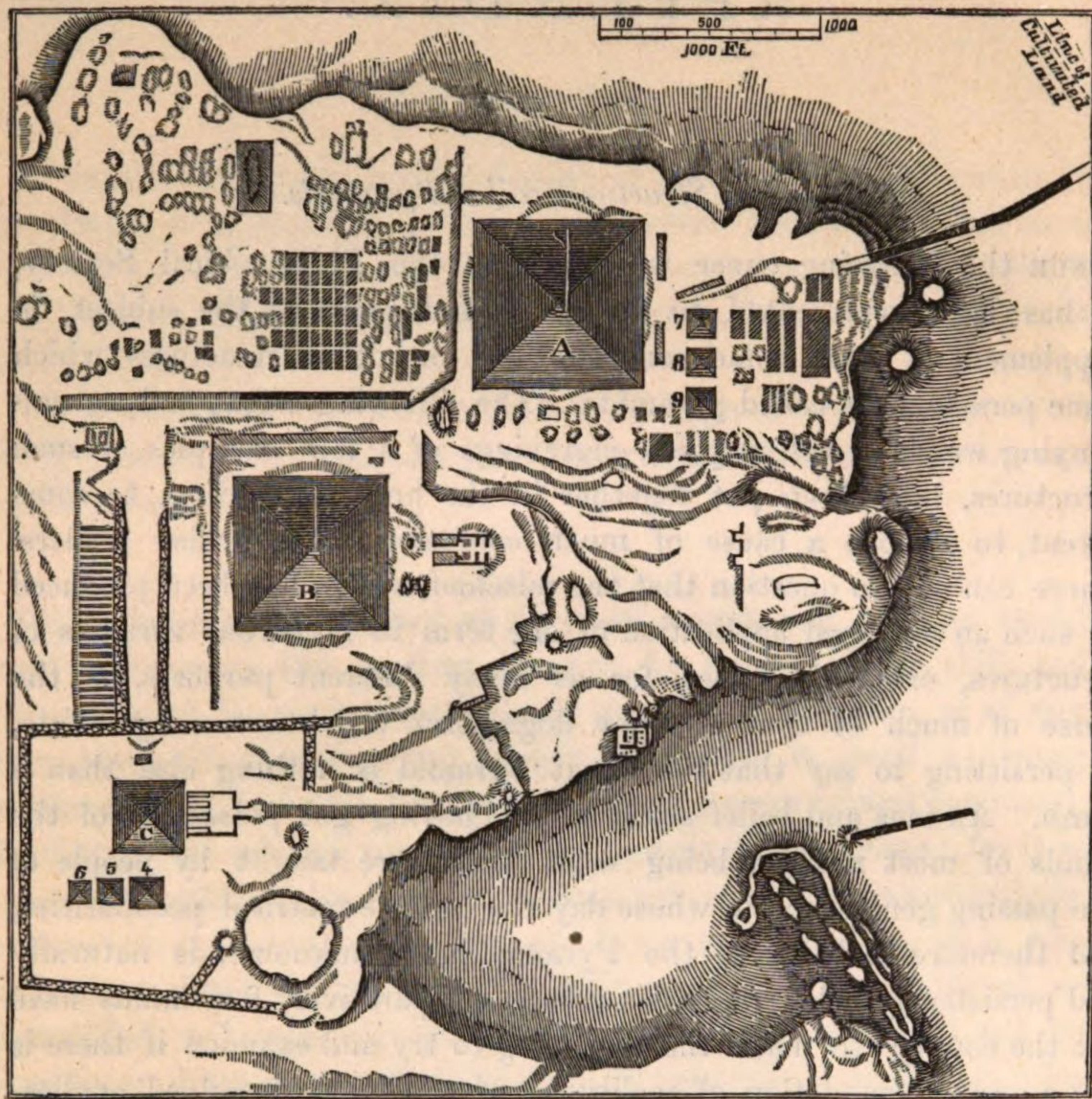


Fig. 1.

of orientation. I take it for granted that the well-recognized internal splendour and structural magnificence of the Great Pyramid are both well understood; also that not even another Jeezeh, or other Egyptian pyramid, resembles it, except in that they are entered by passages similarly situated, but of vastly inferior structure, to its entrance passage. None of them contain any chambers, except such as are subterranean, and in no way symmetrical. They are all of different proportions, and all smaller than the Great Pyramid. Yet Sir J. Y. Simpson indeed declares that it is just like any of the other pyramids—Irish, American, &c., &c. He brings up the New Grange tumulus, and pretends to compare this with the majestic Jeezeh mass; and endeavours to add weight to his argument by quoting from Sir William Wilde, who, in writing on the Boyne tumulus, and comparing it with the pyramids he had seen in

Egypt, says, "*the type and purpose is all the same.*" I strongly suspect this idea Sir William Wilde borrowed from Governor Pownall, who described this barrow in the *Archæologia*.

I have purposely taken some pains to represent this structure, on which so much dependence appears to be placed, so that we may not fail to discover the similarity and identity, if such exist; for it is declared that their oneness of purpose does exist. Let us see, then, if we can find it. Fig. 2 is a section of "the Great Pyramid of the

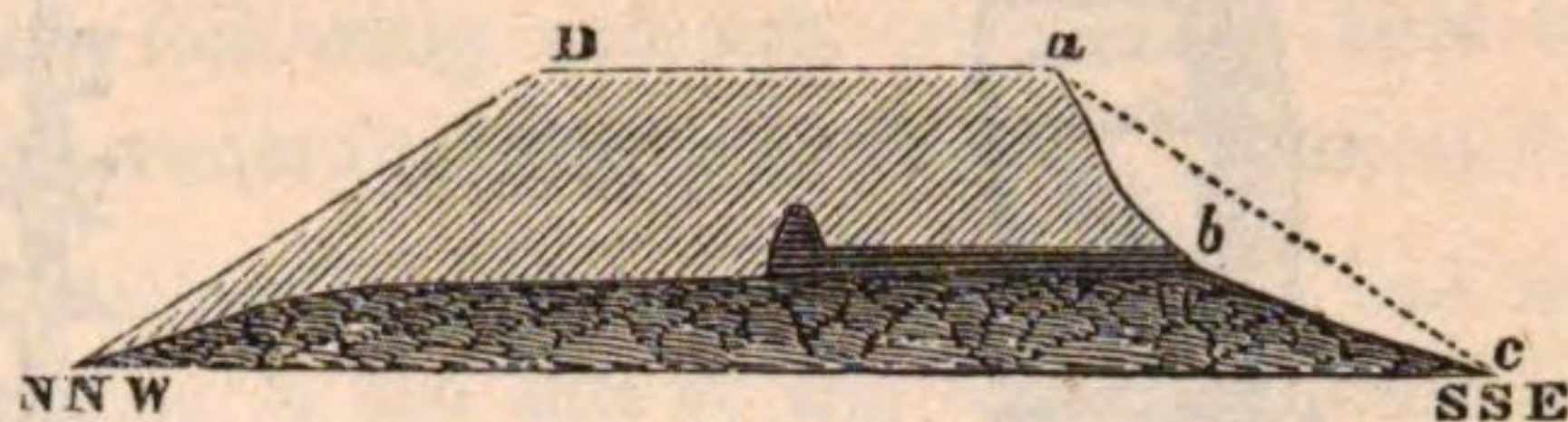


Fig. 2.

Boyne," whilst Fig. 3 is a plan of the same notable structure. It is well to remark its trapezoidal base, and the position of the passage leading

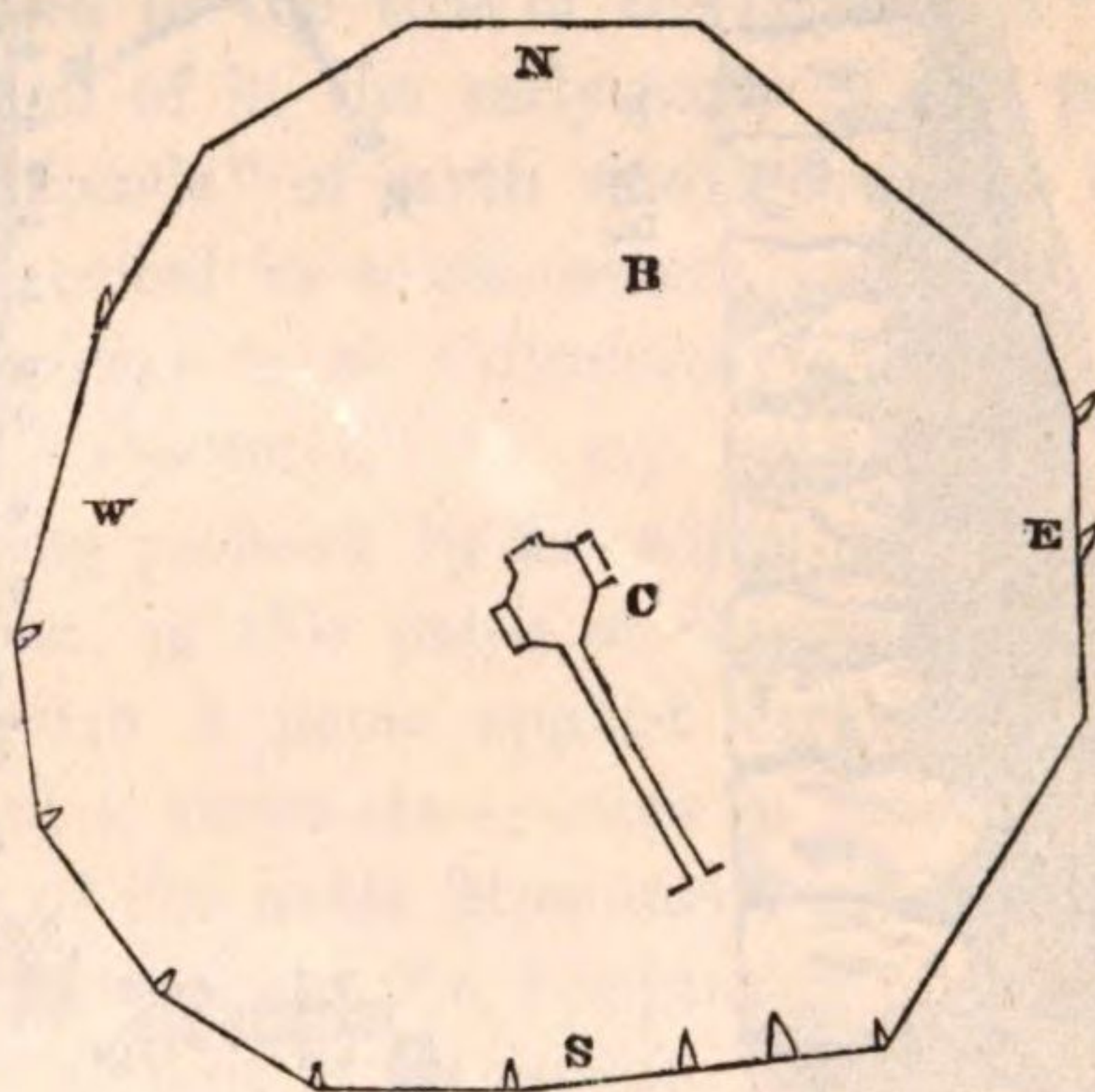


Fig. 3.

to the sepulchral chamber, the position of the three niches, and compare the whole with the four cardinal points of the compass; and where do we find an approach to orientation, or even a regular, rectilinear, geometrical figure at all? Where, indeed, is its similarity to the Great Pyramid of Jeezeh? We may perhaps find it in the gallery, or the sepulchral chamber, not improbably in the general structure of its mass of solidity. Let us, then, look at its gallery and chamber in sectional elevation looking east, Fig. 4, and in plan, Fig. 5; and then we may consider one of the rudely, somewhat oval-shaped stone pans or basins shown at Figs. 6 and 7; and is there a feature like the Great Pyramid, or even anything nearly so good as the very worst pyramidal mound that has been found anywhere throughout the Nile valley? This Irish tumulus was very elaborately explained about the year 1770 A.D., by

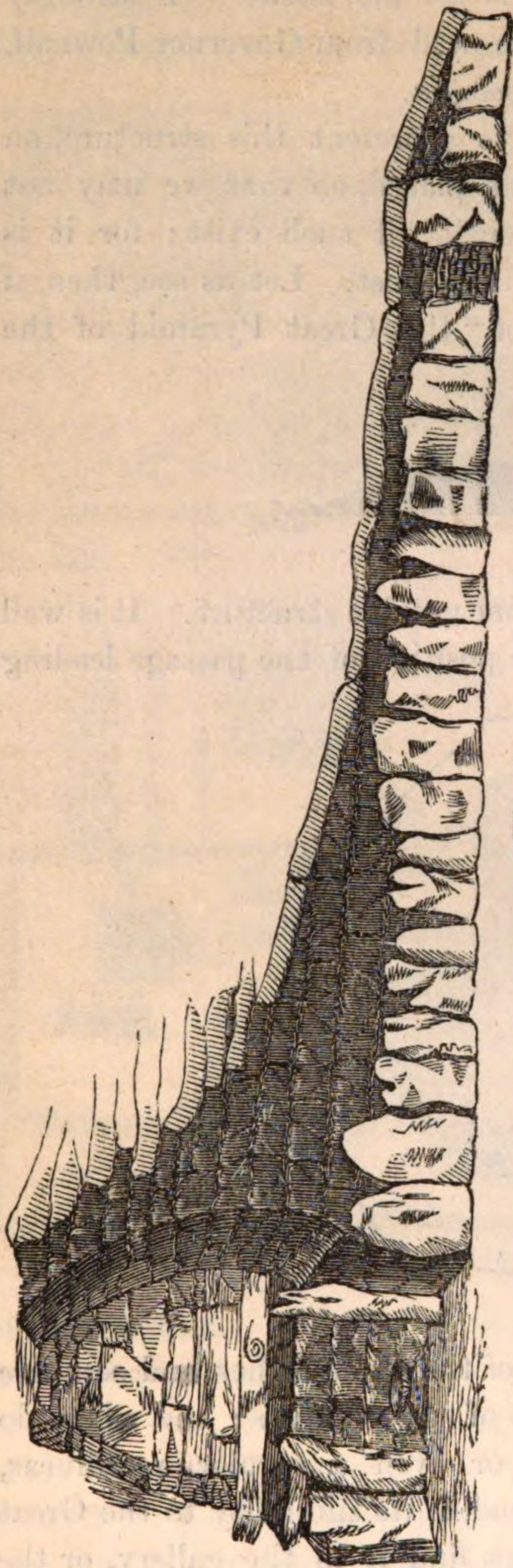


Fig. 4.

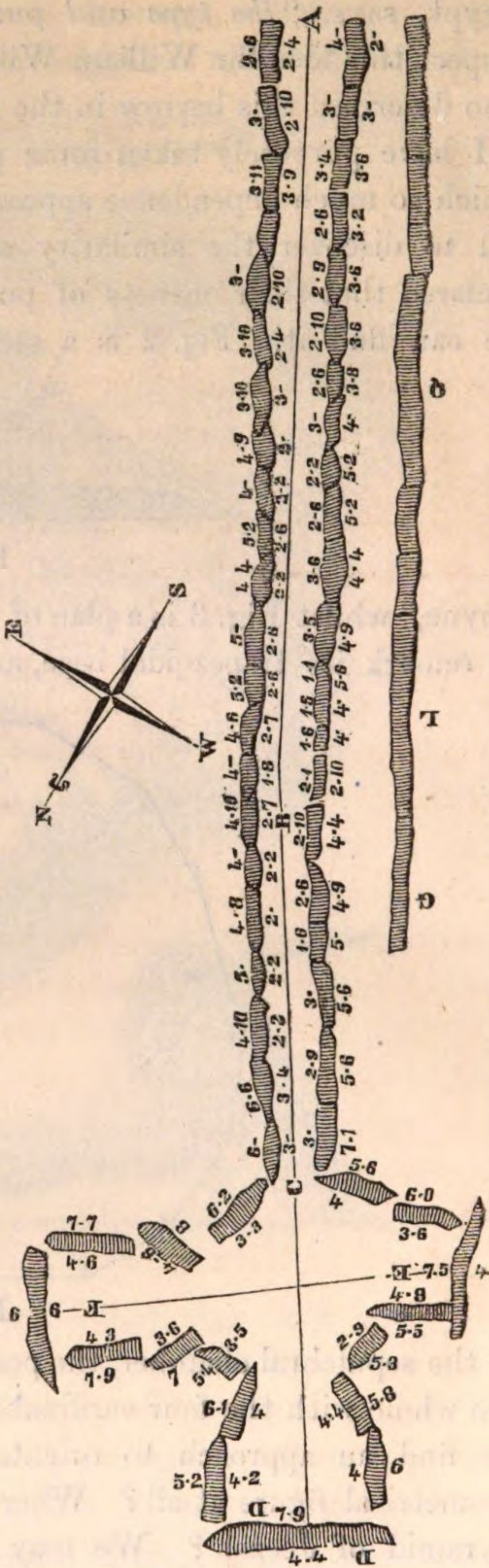
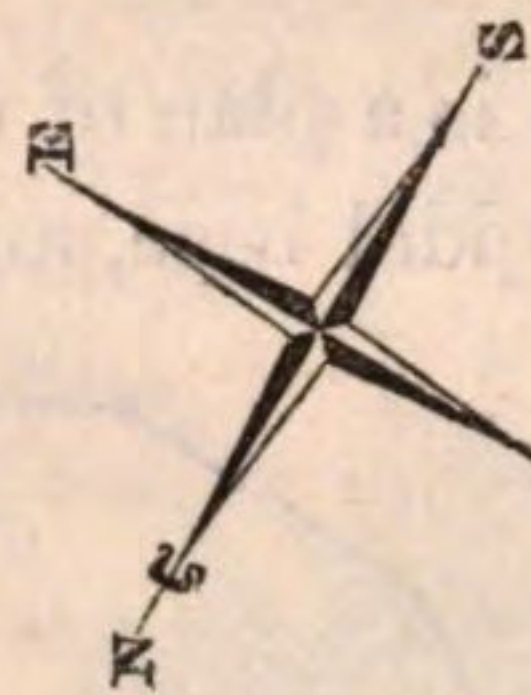


Fig. 5.

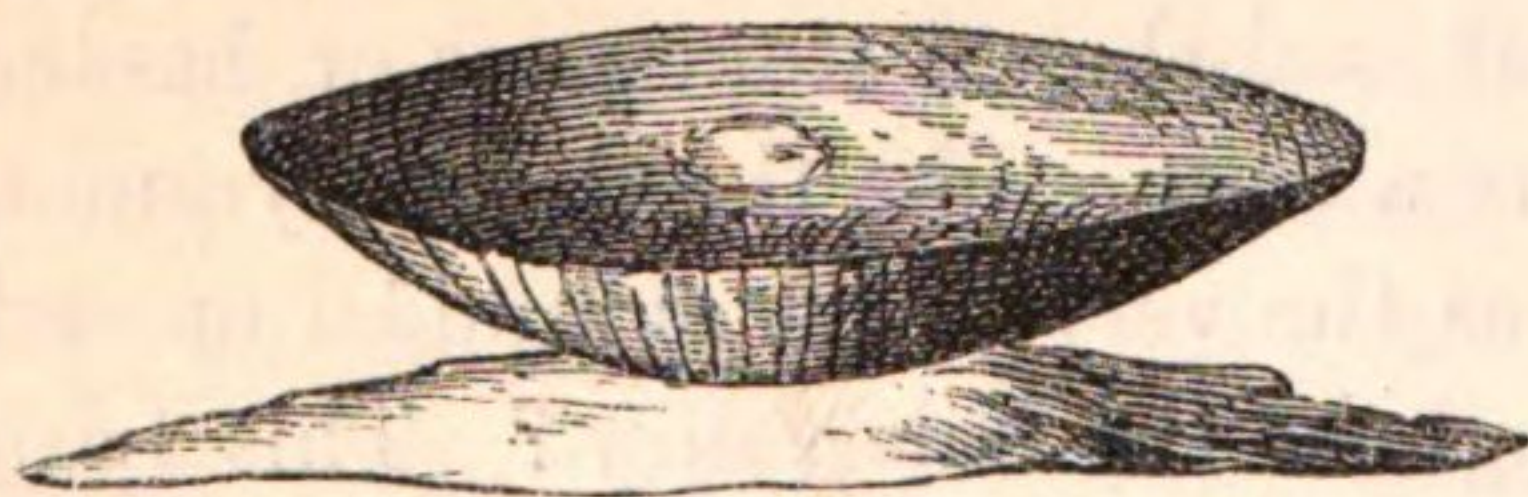


Fig. 6.

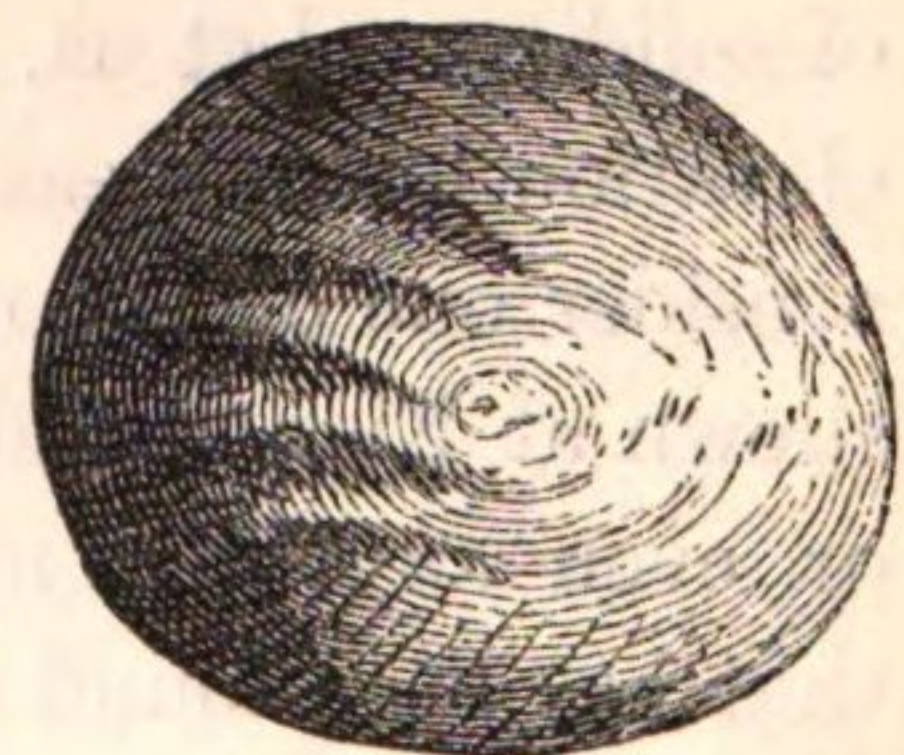


Fig. 7.

Governor Thomas Pownall, who wrote a creditably complete paper concerning it, and expended much money and time in having it properly surveyed by a Mr. Bowie, under the direction of Dr. Norris, "master of the great school of Drogheda," and from whose measurement and examination a complete set of drawings were made. The paper and engravings from these drawings were brought before the Society of Antiquaries of London in June, 1770; and from these drawings, published in the *Archæologia*, vol. ii., I have prepared the illustrations, whilst the following extracts respecting this tumulus are transcribed from the venerable pages of that publication.*

(Page 238.) "Accident in like manner about the end of the last century discovered an opening in the side of the *Great Pyramid at New Grange*† in Ireland; and this aperture, by a gallery, led to a cemetery composed of three tabernacles or niches in the centre of the base."

Now, this is the first clue that I am able to find wherein the tumulus (notably mentioned in the title of the paper as a "Sepulchral Monument," and spoken of in the early parts of the paper as one of the "tumuli" or "mounds" of earth raised over the bodies of great and famous persons—called in south-eastern countries *Bougors*, and by us Burrows or Barrows) is so ridiculously dignified with a name even approaching to "*Pyramid*," to say nothing of ascending to the distinction of being prefixed by the adjective "*Great*." No doubt Sir James Y. Simpson, in this paper of Governor Pownall's, found it so called, and as such a name applied certainly with some show of authority to such a structure—comes in most fittingly for his attack on the character of the noble Monument at Jeezeh—it was indeed no doubt hard to leave alone the temptation of using (what seemed to him) so powerful an unit in his assault.

(Page 250.) "As most, if not all, the Barrows which we know of (a few small carneddas excepted) are formed of earth, you will, upon your approach to this, be surprised to find it a pyramid of stone, compiled of *pebble* or *cogle* stones, such as are commonly used in paving. But what conceptions must we have of the expense of labour and time, and of the number of hands necessary to such a work, when we understand that these stones must have been brought hither not less than twelve or fourteen miles from the sea-coast, at the mouth of the Boyne! Such materials lie there; but I am assured, by gentlemen who know the country where this monument is erected, that there are no such stones as it is composed of to be found within land. When I add to all this, that, upon a calculation

* The title of this paper, which is well worth careful reading, is, "A Description of the Sepulchral Monument at New Grange, near Drogheda, in the County of Meath, in Ireland." By Thomas Pownall, Esq., in a letter to the Rev. Gregory Sharpe, D.D., Master of the Temple.

† These italics are mine.

raised from the most moderate state of its measurements, the solid contents of this stupendous pile amount to 189,000 tons weight of stone, your astonishment must, I think, be raised to the highest pitch."

Language of the kind now quoted is almost certain to inflame the mind of any man not accustomed to works in masonry, earth, and so forth, nor used to handle large round masses of figures, with a picture immensely extravagant and wide of the true nature of things; and to any one setting about an assault like that of the Edinburgh medical baronet—who, from his busy professional occupation, can hardly have the necessary time, and but few opportunities of practising that special kind of observation so necessary for the real appreciation of ancient as well as modern practice in the structural arts—certainly this dashing language of Governor Pownall's comes most opportunely for his purpose; but it loses its force when we find this "pyramid of stone" is "compiled of pebble or cogle-stones." Let it be remembered that a really *pyramidal* structure, by which use of the adjective I mean a solid terminating in an apex, unless extremely flat, could never have been erected of such material. I should say, with a much flatter angle of side than that shown by Fig. 2; as, when approaching the apex, the weight of the uppermost layers of stones, having but so small a surface of support compared to that of the under layers, and the inclination of such structure being so much in excess of the angle of repose of the material (piled together loosely, as it is reported to be), the tendency and direct result of the uppermost part, if such ever existed, would be to slide down the sides and accumulate round the base, thus making the angle of side even less than at first (supposing for the moment that the structure was originally apiculated), we may therefore safely conclude that from the practical difficulty, nay, impossibility, of making such a structure terminate with its angle of side in an apex, it never could have so terminated, and therefore never existed in any state far different from the extremely rude approximation to a conic frustum which it now presents.

(Page 253.) "Fig. 3 gives the plan of the base drawn according to Mr. Bowie's stations in measuring it; but you must understand that the periphery of the real figure is curvilinear, not rectilinear. This base covers about two acres of ground. c is the plan of the cave and the gallery leading to it; as it bears 24° N.W. Fig. 3 is the section of the pyramid, and of the ground on which it stands, projected from a medium of the various numbers I have received. The whole is laid down by a scale of 84 feet to an inch."

(that is, 168 feet to an inch in the illustration now given by me—these being one-half the size of those by Governor Pownall).

"This pyramid was encircled at the base with a number of enormous unhewn stones set upright, of which ten were remaining when I was on the spot. These you will see marked in the plan. Nine of them are still in their erect position, the tenth is thrown down. I measured many of these stones, and found them from seven to nine feet high above ground; that which is thrown down, and lies quite out of the ground, measured near eleven feet. Their forms are various and anomalous. Upon a rough estimate they may be supposed to weigh from eight to twelve tons each. Mr. Lhwyd says there was a stone of considerable bulk erected on the summit of this pyramid, of the same anomalous form as the others, but of less size. But there were no remains of such when I was there.

"The pyramid in its present state is, as I said, but a ruin of what it was. It has long served as a stone quarry to the country round about. All the roads in the neighbourhood are paved with its stones: immense quantities have been taken away. Mr. Lhwyd mentions the particular instance which gave occasion to the discovery of the gallery that leads to the cemetery. The mouth of this gallery, under the perfect state of the monument, lay concealed and shut up near 40 feet within the body of the pile. The dotted line *a c*, in the section, Fig. 2, gives the supposed perfect side. The triangle *a, b, c* is the hollow space from whence, as from a stone quarry, the stones have been taken; *b* marks the mouth of the gallery. This gallery is formed by large flag stones. Those which compose its sides are set on edge, and are of different altitudes, from 2 to 7 feet high, and of various breadths from 2 to 3 feet 6 inches, as may be seen by the figures in the plan Fig. 5, where the figures on the outside denote the altitude of the stones, those on the inside their breadth. The thickness of each could not be taken with any certainty; but some of the large ones which form the cemetery are from $1\frac{1}{2}$ foot to 2 feet thick.

"Fig. 4 gives a section of the gallery, and of the east tabernacle or niche in the cemetery. Fig. 8 is a perspective section of the north side opposite to the entrance.

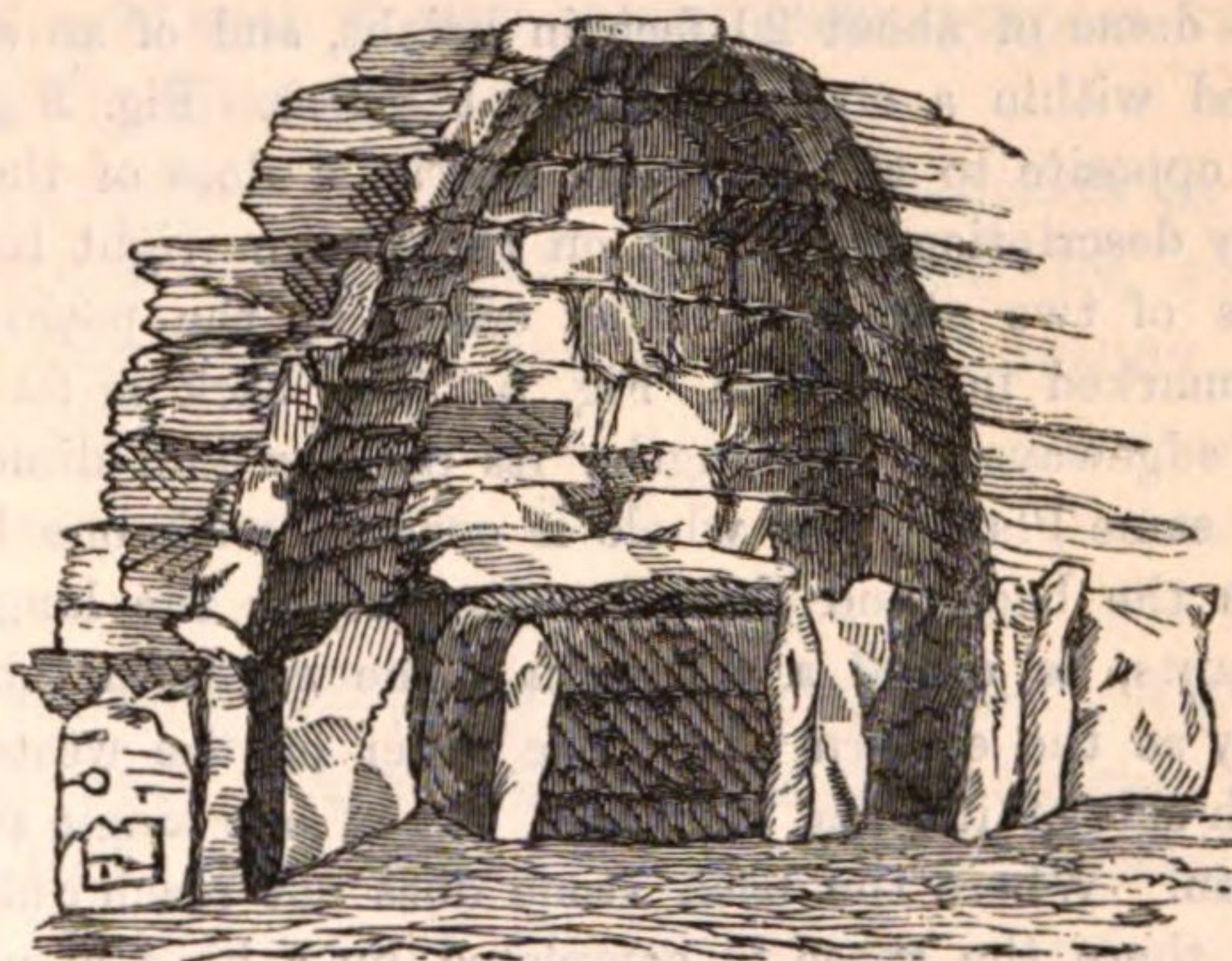


Fig. 8.

"One of the stones, marked *q*, Fig. 5, which lies across, and forms part of the top or roof of the gallery, is 13 feet long and 5 feet broad; another at *L* is 11 feet long and 4 feet 6 inches broad.

"This gallery at the mouth is 3 feet wide and 2 feet high. At 13 feet from the mouth it is only 2 feet 2 inches wide at the bottom, and of an indeterminate

width and height. Four of the side stones, beginning from the fifth on the right hand, or eastern side, stand now leaning over to the opposite side; so that here the passage is scarce permeable. We made our way by creeping on our hands and knees till we came to this part. Here we were forced to turn upon our sides, and edge ourselves on with one elbow and one foot. After we had passed this strait we were enabled to stand; and by degrees, as we advanced farther, we could walk upright, as the height above us increased from 6 to 9 feet. The distance from A to B in the ground plot, Fig. 5, is 42 feet; from B to C is 19 feet 4 inches; from C to D, 19 feet 2 inches; from E to F, 21 feet. You will observe from the Plan that, although the cemetery is an irregular polygon, yet it is such an octagon as might be supposed to be formed with such rough materials into so rude a style of architecture. The dome of this cave or cemetery springs, at various unequal heights, from 8 to 9 and 10 feet on different sides, forming at first a coving of eight sides. At the height of 15 or 16 feet, the north and south sides of this coving run to a point like a gore, and the coving continues its spring with six sides; the east side coming to a point next, it is reduced to five sides; the west next; and the dome ends and closes with four sides, not tied with a keystone, but capped with a flat flag stone of 3 feet 10 inches by 3 feet 5 inches. The construction of this dome is not formed by keystones, whose sides are the radii of a circle, or of an ellipsis converging to a centre. It is combined with great long flat stones, each of the upper stones projecting a little beyond the end of that immediately beneath it, the part projecting and weight supported by it bearing so small a proportion to the weight which presses down the part supported, the greater the general weight is which is laid upon such a cove the firmer it is compacted in all its parts. This will appear without any further explanation, from a bare inspection of Figs. 4 and 6.

"The eight sides of this polygon are thus formed. The aperture which forms the entrance, and the three niches or tabernacles, make four sides, and the four imposts the other four. Upon the whole, this cemetery is an octagon with a dome of about 20 feet in height, and of an area which may be circumscribed within a circle of 17 or $17\frac{1}{2}$ feet. Fig. 8 gives a view of the tabernacle opposite to the entrance, as Fig. 4 does of the east side one. I will begin my description with that on the east, or right hand. Each side of this consists of two stones standing erect, in the position and of the dimensions as marked in the Plan, Fig. 5. The back is formed by a large flat stone laid edgewise at its length; its position and dimensions are also marked in the same Plan. The whole is covered with one large flat stone, sloping towards the back, and thus forms what, in the language of the old British inhabitants, is called a Kistvaën. The northern tabernacle is constructed exactly as the eastern one. The other on the western or left hand side differs, each side of it being composed but of one single stone, as may be seen in the plan. Where the back stone does not reach quite up to the top covering stone, there the space is completed by a kind of masonry of three courses. The northern tabernacle hath for its floor a long flat stone, 6 feet 8 inches long by 4 feet 11 inches broad. The two side niches have no other floor but the natural ground. They have, however, each of them, a rock basin placed within them. That in the left-hand niche stands on the natural ground. That on the right is placed upon a kind of base. It appeared to me, when I made my sketch, rather convex than as it is described by others, and as given to

me by Mr. Bowie. But herein I may have been misled by the earth which lay about it. As this basin seemed to have the sides of its concave fluted, I desired particularly that the surveyor might clean it and wash it; that if there was anything singular it might be observed. Nothing particular was found there; so take the draught just as I first sketched it. The basin on the right hand, as the surveyor gives me the measure, is 4 feet 9 inches by 3 feet 4 inches; as I measured it, it is 3 feet 11 inches by 3 feet 5 inches. The surveyor's measure of the base is 6 feet by 5 feet 4 inches. The basin in the left-hand tabernacle is exactly of the same form as the other; its dimensions 4 feet 4 inches by 3 feet 7 inches. In the narrow point of its oval it is 2 feet broad. Dr. Molineux, in his account of this cemetery, says that there was a rock bason in each niche; and as that stone which I have described as a base is a concave, forming a basin like the rest, it may at the first view seem to give some foundation for this account. But Mr. Lhwyd says expressly, 'that in each cell or apartment on the right and left hand was a broad shallow basin of stone; the basin on the right hand stood within another; that on the left hand was single; and in the apartment straight forward there was none at all.' As this account was prior to the Doctor's, and as both the drawing and Plan from which the Doctor wrote describe this base-stone (which one might suppose to be the third basin) as actually then standing as a base to the right-hand basin, it is clear that the Doctor was mistaken; and indeed a bare view of the inaccurate plan from which he wrote his description shows how that mistake arose."

Thus far, then, we have no difficulty in fully understanding what sort of thing this New Grange affair is, which has recently been set up, with such a sham show of authority, as a rival to the Great Pyramid of Jeezeh, and I am sure that it is needless to say another word concerning it; although for those who, not knowing what they really do, in striving to tear down to the foundation that truth bound up in the Great Pyramid,—to such it may answer their purpose to classify two things of so totally dissimilar character.

When we consider that the earliest monuments in Europe were mounds of earth, or cairns of stones raised by some Turanian offspring over the remains of the dead; and knowing that, in very early instances, they were left simply rough and apparently unfinished, the New Grange monument, from the circle of basement stones, appears to be of not earlier than Etruscan date. The Etruscans improved upon the older tumuli by surrounding the base with a podium, or supporting wall. The Etruscan tumuli appear to be always circular; still they have been, and are yet being persistently, called pyramids; as in the case of the Regolini Galeassi tomb, and the Cocumella Vulci, whilst in Asia Minor the same order of tumulus is found as at Tantalais on the north shore of the Gulf of Smyrna. The New Grange mound is altogether a most inferior example of a tumulus: there are many others in Europe—yea, even in our own British Isles—of far higher structural type.

American Pyramids.

Passing from Europe to America, we find quite another order of things there called pyramids. Besides the various sepulchral tumuli of earth and loose stones in various parts of that country, there are to be found several huge masonry erections, two of which are shown at Plates V. and VI.—namely, the Pyramid of Oajaca at Tehuantepec, and the Teocalli at Palenque.

In Stephen and Catherwood's *Central America*, 1854, the distinctive character of these American pyramids is thus mentioned, p. 529:—

“The pyramids of Egypt are known to have interior chambers; these (namely, the American) are of solid earth and stone. No interior chambers have ever been discovered, and probably none exist. And the most radical difference of all is, the pyramids of Egypt are complete in themselves. The structures of this country (America) were erected only to serve as the foundations of buildings. There is no pyramid in Egypt with a palace or temple upon it; there is no pyramidal structure in this country without,—at least, none from whose condition any judgment can be formed.”

Fergusson in his *History of Architecture* remarks:—

“The principal monuments of the valley are the Teocallis—literally, Houses of God—the Temples of the people. These are pyramids in terraces, with flat tops, and always surmounted by a chamber or cell, which is in fact in the temple itself. They seem to be of all ages, for, if one may trust the tradition, that of Cholulu is as old as the early Toltecs, whereas the great Teocalli of the city of Mexico was only finished five years before the discovery of America by Columbus, and the Spaniards met with many persons who had assisted in its erection. It has, however, with all the native buildings of the city, been swept away by the ruthless bigotry of the conquerors. . . .

“Of these teocallis, the largest, probably also the oldest, is that of Cholulu. Its dimensions, in so far as it can be ascertained in its present ruinous state, are 1,440 feet square, and 177 feet in height, divided in four storeys, the fifth being formed by the cell or temple, which has now been replaced by a chapel dedicated to the Virgin Mary. The whole is composed of badly burnt bricks and mud, and is now so overgrown with trees, that it is difficult to make out its form; but in Humboldt's time it apparently was freer from obstruction and more easily traced.

“There are two pyramids at Teotihuacan, the largest of which is apparently a square of 645 feet, with a height of 171 feet; and there are others at Tezcucó of about the same dimensions, and, like them, divided into five or seven storeys, but the most interesting of those yet brought to light is that of Xochicalco. It is situated on the top of what appears to be a natural elevation, but which has been fashioned into terraces by art. The pyramid itself is in five storeys. . . .

“Besides these great many-storeyed pyramids, there are numerous examples in various parts of the country of one storey only; several of these have been described, but unfortunately not drawn. Their general arrangement may,

however, be judged of from the example from Oajaca, Plate V. Like all others in Mexico, it is only a device to raise a temple to such a height as should give it dignity, and enable the ceremonies performed on its upper platform to be seen by all the people.

"It is indispensably necessary to bear this distinction in mind in speaking of these monuments, as careless writers, connecting the word pyramid with Egypt, have been too apt to confound together two classes of monuments entirely distinct and dissimilar. . . . In no instance (of Egyptian pyramids) are there external steps leading to a cell or chamber on the apex. . . . The Assyrian pyramids, on the contrary, have much more affinity with the buildings of which we are now speaking. They were always in terraces, the upper platform was always crowned by a chamber or cell, and there were external steps leading to this, which was the principal object of the erection. We have traced this form of temple to the shores of the Eastern Ocean. If we still, however, hesitate to pronounce that there was any connection between the builders of the pyramids of Suku and Oajaca, or the temples of Xochicalco and Boro Buddor, we must at least allow that the likeness is startling, and difficult to account for on the theory of mere accidental coincidence. . . .

"As in Mexico, the principal monument of Yucatan is the Teocalli. In the latter province, however, they seem to differ somewhat in design from those above described. They are not generally in terraces, but rise, at an angle of about 45° , to the level of the platform on which the temple stands; and a magnificent unbroken flight of steps leads from the base of the building to its summit. Almost all these retain more or less of the remains of architectural magnificence that once adorned their summits. The annexed Plate, VI., representing the elevation of a temple at Palenque supported by a pyramid, will give a good general idea of their form. The pyramid is about 280 feet square, and 60 feet in height: on the top of it stands the temple, 76 feet wide in front, and 25 feet deep, ornamented in stucco with bassi-relievi of better execution than is usually found in these parts, and with large hieroglyphical tablets, whose decipherment, were it possible, would probably reveal to us much of the history of these buildings.

"The other temples found in Yucatan differ but little from this one, except in size, and, architecturally speaking, are less interesting than the palaces—the splendour of the temple consisting in the size of its pyramid, to which the superstructure is only the crowning member: in the palace, on the other hand, the pyramid is entirely subordinate to the building it supports, forming merely an appropriate and convenient pedestal, just sufficient to give it a proper degree of architectural effect."

Ethiopian Pyramids.

At several spots scattered on the banks of the Upper Nile we find various structures, many of them somewhat pyramidal in form, yet few, if any of them, bear any traces of ever having been finished in a sharp apex at the summit: on the contrary, all of these concerning which I can gather information, bear very decided significance of having

terminated in a *flat* top,—an architectural finish unknown in any purely Lower Egyptian Pyramid. Whilst the Meroë Pyramids belong to a unique and distinct order, their inferiority of construction is particularly remarkable, the pyramid part of the building being in most cases nothing more than a heap or pile of loose and rough material covered by a casing of wrought stone, the latter frequently very uneven and badly jointed. They are also remarkable in being finished with a pronaos or porch, sometimes of very large dimensions, while frequently much smaller, as shown at Plates VII., VIII., and IX.; the pronaos constituting the receptacle for the dead, and therefore the only really useful part of the structure. The Meroë Pyramids have been pitched down wherever it seems to have pleased the builder, as may be gathered from the plans in Plates VII. and IX., none being oriented; and each constructor appears to have adopted whatever form or finish he chose. Judging from the drawing in Lepsius's *Denkmaeler*, some of them are much ornamented on the exterior, some plain, and others apparently unfinished, whilst a peculiarity appears to exist in the case of a roll moulding at all the angles, this in some cases being cut on the outer end of the casing stones, as shown at Fig. 1, Plate VIII. In others the angles are composed of prisms of stone let into the angular space formed at the junction of two surfaces of casing stones, as shown at Fig. 2, Plate IX.; whilst in others the flat surfaces of the casing stones themselves are ornamented with a raised panel, as shown at Fig. 3, Plate IX., which represents part of a casing stone surface, and in which the unevenness of the joints is plainly seen. Again, some of these Meroë buildings are formed of stepped surfaces, as shown at Fig. 4, Plate IX., each layer of casing stones receding inwards from that immediately below it, but with the sides inclining, although to a less degree than the actual inclination of the whole side of the structure itself.

Speaking of Ethiopian structures, Fergusson, in his *History of Architecture*, says:—

“The most remarkable monuments of the Ethiopian kingdom are the pyramids, of which three great groups have been discovered and described. The principal group is at a place called Dankelah, the assumed site of the ancient Meroë, in latitude 17° north. Another is at Gibel Barkal; the third at Nourri, a few miles lower down than the last named, but probably only another necropolis of the same city.

“Compared with the great Memphite examples, these pyramids are most insignificant in size,—the largest at Nourri being only 110 feet by 100; at Gibel Barkal the largest is only 88 feet square; at Meroë none exceed 60 feet each way. They differ also in form from those of Egypt, being much steeper, as their height is generally equal to the width of the base. They also all

possess the roll moulding on their angles, and all have a little porch or pronaos attached to one side, generally ornamented with sculpture, and forming either a chapel, or more probably the place where the coffin of the deceased was placed. We know from the Greeks that, so far from concealing the bodies of their dead, the Ethiopians had a manner of preserving them in some transparent substance, which rendered them permanently visible after death.

“To those familiar with the rigid orientation of those of Lower Egypt, perhaps the most striking peculiarity of the pyramids is the more than Theban irregularity with which they are arranged, no two being ever placed, except by accident, at the same angle to the meridian, but the whole being grouped with the most picturesque diversity, as chance appears to have dictated.

“Among their constructive peculiarities it may be mentioned that they seem all to have been first built in successive terraces, each less in dimensions than that below it, something like the great pyramid at Saccara, these being afterwards smoothed over by the external straight-lined coating.

“Like the temples of Gibel Barkal, all these buildings appear to belong to the Tirhakah epoch of the Ethiopian kingdom. It is extremely improbable that any of them are as old as the time of Solomon, or that any are later than the age of Cambyses, every indication seeming to point to a date between these two great epochs in the connection of African history with that of Asia.”

Assyrian Pyramids.

Most probably owing to the forms of some of the ruinous piles situated on the banks of the Euphrates approximating to that which a true pyramid in a state of far-gone dilapidation and decay would, and in many cases even of the Egyptian pyramids, has assumed,—has the word been applied to several proto-Chaldean, as well as later Chaldean, structures. These structures, although for long years mere shapeless masses, we know now, by the light which has been shed upon them by the comparatively recent investigations of Rawlinson, Layard, Loftus, and Taylor (although in no case does it appear that anything has been found which renders quite certain our restoration to the original architectural forms entirely), were chiefly temples situated on the top of vast terraced blocks of brick-work, as in the case of the Birš Nimroud and the Mugheyr. It is needless to add that some of these structures were highly ornamented, and contain many points of strictly architectural and no doubt capricious finish, totally devoid of anything that can scientifically be considered pyramidal. Indeed, they are entirely non-pyramidal, unless “pyramid” be taken to mean (which it certainly ought not) a heap of any form, composed in any possible way, between the limits of the rudest burial-mound of the wildest savage, up to the unequalled masonry of the profoundly meaning Jeezeh pile.

The remains of the earliest proto-Chaldean temple can scarcely be of

remoter date than about 1900 B.C.; and the chief cause why it is so difficult to form a correct representation of the old form of temple is, that the material of which most were composed was either sun-dried or very imperfectly burned brick. The later Chaldean temples, of date about 600 B.C., and up to the time when Babylon was taken by Cyrus, appear to have been constructed of a better class of bricks; but vast quantities of them have been quarried out of the older edifices and used in the construction of other buildings, raised by succeeding occupants of the country, according to their caprice and taste. To a large extent we owe our own ideas of what these Babylonian structures were to the copying of some of them in stone by the Persians in their own country, as in the case of the alleged tomb of Cyrus at Passargadæ.

Speaking of these structures, Fergusson, who compiles his information from the writings of Rawlinson, Loftus, Layard, and Taylor, says:—

“The oldest temple we know of at present is the Bowariyeh at Wurka (Erek), erected by Uruk, at least 2,000 years B.C.; but now so utterly ruined, that it is difficult to make out what it originally was like. It seems, however, to have consisted of two storeys at least: the lowest about 200 feet square, of sun-dried bricks; the upper is faced with burnt bricks, apparently of a more modern date. The height of the two storeys taken together is now about 100 feet; and it is nearly certain that a third, or chamber storey, existed above what now appears.

“The Mugheyr Temple is somewhat better preserved, but in this case it is only the lower storey that can be considered old. The cylinders found in the angles of the upper part belong to Nabonidus, the last king of the later Babylonian kingdom; and the third storey only exists in tradition. Still, from such information as we have, we gather that its plan was originally a rectangle 198 feet by 133, with nine buttresses in the longer and 6 in the shorter faces. The walls slope inwards in the ratio of 1 in 10. Above them was a second storey, 119 feet by 75, placed, as is usual, near one end of the lower storey, so as to admit of a staircase being added at the other. It is 47 feet distant from the south-eastern end, and only 28 or 30 from the other; but whether the whole of this was occupied by a flight of steps or not is by no means clear. Taken altogether, the plan and probable appearance of the building when complete may have been something like that represented in Plate X., though there are too many elements of uncertainty to make it a restoration which can altogether be depended upon.

“The typical example of this class of temples is the Birs Nimroud. It is true that as it now stands every brick bears the stamp of Nebuchadnassar, by whom it was repaired, perhaps nearly rebuilt; but there is no reason for supposing that he changed the original plan, or that the sacred form of these temples had altered in the interval. It owes its more perfect preservation to the fact of the upper storey having been vitrified after erection by some process we do not quite understand.* This now forms a mass of slag,

which has to a great extent protected the lower storeys from atmospheric influences.*

"In so far as it has been explored, the lower storey forms a perfect square, 272 feet each way. Above this are six storeys, each 42 feet less in horizontal dimensions. These are not placed concentrically on those below them, but at a distance of only 12 feet from the south-eastern edge, and consequently 30 feet from the N.W., and 21 feet from the two other sides.

"The height of the three upper storeys seems to have been ascertained with sufficient correctness to be 15 feet each, or 45 feet together. Unfortunately no excavation was undertaken to ascertain the height of the lowest and most important storey. Sir Henry Rawlinson assumes it at 26; and I have ventured to make it 45, from the analogy of the tomb of Cyrus and the temple at Mugheyr. The height of the two intermediate storeys, instead of being 22 feet 6 inches, as we might expect, was 26, which seems to have resulted from some adjustment due to the chambers which ranged along their walls on two sides. The exact form and dimensions of these chambers were not ascertained, which is very much to be regretted, as they seem the counterpart of those which surrounded Solomon's temple and the Viharas in India, and are consequently among the most interesting peculiarities of this building.

"No attempt was made to investigate the design of the upper storey, though it does not seem that it would be difficult to do so, as fragments of its vaulted roof are strewn about the base of the tower-like fragment that remains, from which a restoration might be effected by any one accustomed to such investigations. What we do know is that it was the cella or sanctuary of the temple. There probably also was a shrine on the third platform.

"This temple, as we know from the decipherment of the cylinders which were found on its angles, was dedicated to the seven planets or heavenly spheres, and we find it consequently adorned with the colours of each. The lower, which was also richly panelled, was black, the colour of Saturn; the next, orange, the colour of Jupiter; the third, red, emblematic of Mars; the fourth, yellow, belonging to the sun; the fifth and sixth, green and blue respectively, as dedicated to Venus and Mercury; and the upper probably white, that being the colour belonging to the moon, whose place in the Chaldean system would be uppermost. A general idea of this structure may be gathered from Plate XI.

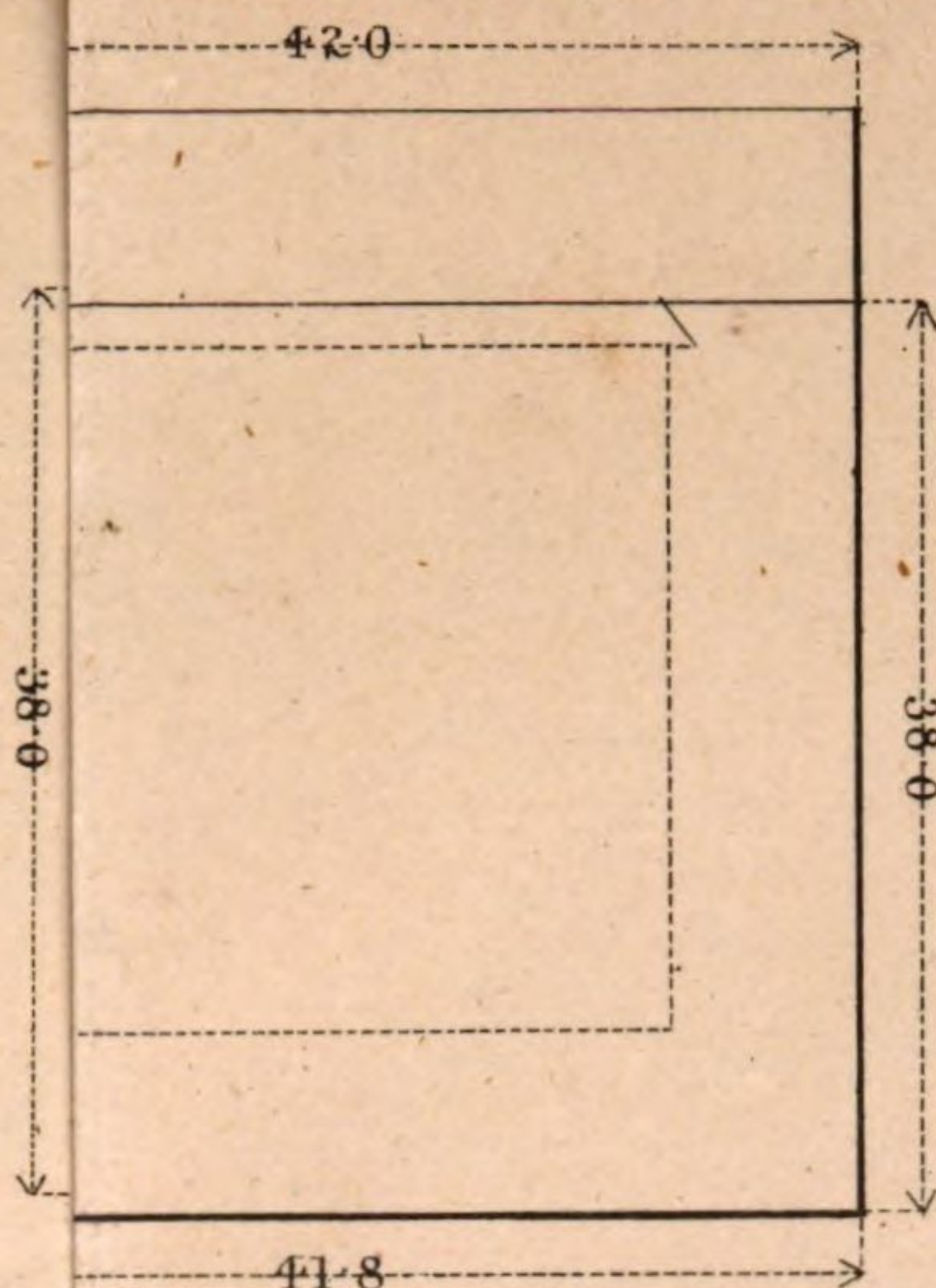
"Access to each of these storeys was obtained by stairs, probably arranged as shown in the plan, Plate XI. These have crumbled away or been removed, though probably traces of them might still have been found if the explorations had been more complete.

"Another temple of the same class was exhumed at Khorsabad some ten or twelve years ago by M. Place, but his drawings are still unpublished. It consisted, like the one at Borsippa, of seven storeys, but in this instance each was placed concentrically on the one below it; and instead of stairs on the sloping face, a ramp wound round the tower, as we are told was the case with the temple of Belus at Babylon. The four lower storeys are still perfect. Each of them is richly panelled and coloured as above mentioned, and in some parts even the parapet of the ramp still remains *in situ*."

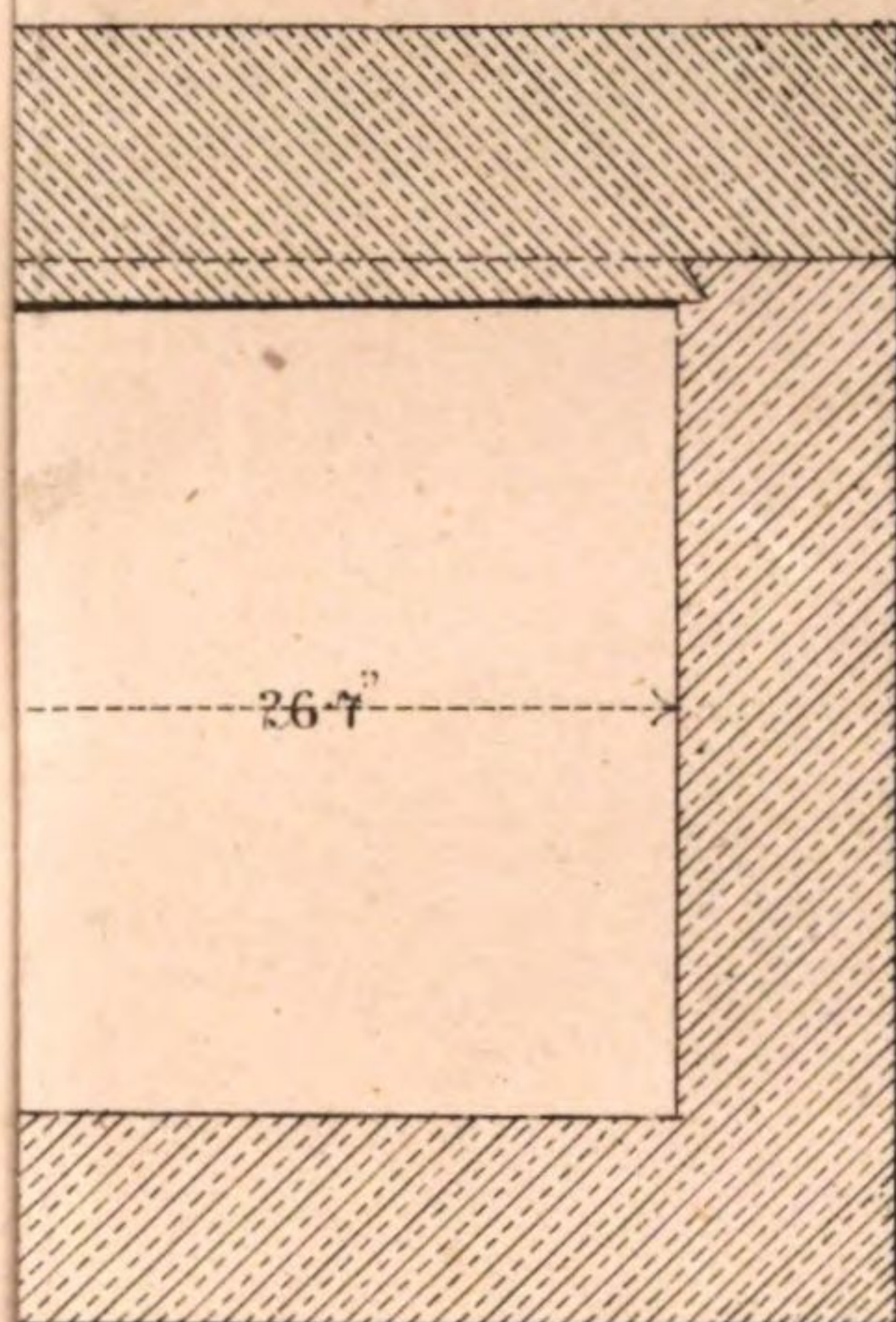
* Fergusson says vitrified. It appears more probable that they may have been cemented together with bitumen, as in the case of the walls of Babylon.

It was my intention to have made these notes on the various structures which are called pyramids much more complete, but the necessity of not delaying publication of the Philosophical Society's Transactions has left me with insufficient opportunity for extending them. However, the foregoing remarks and quotations will, I believe, be sufficient to render intelligible the accompanying plates, and I hope be of use in tending to clear up some of the confusion which appears to exist, as to what structures should and should not be considered pyramids. In bringing the various classes of structures thus together, the main object has been to enable comparisons to be easily made, and after such have been accurately carried *through*, let men pronounce their verdict on the open question, "whether that which satisfactorily and undoubtedly explains every other so-called pyramidal structure, can as satisfactorily and completely explain the great Pyramid of Jeezeh? and if not, what other meaning than one somewhat tombic, but chiefly metrical, and pointing again to something still higher, does so explain it?"

OF SOUTH END WITH LID IN PLACE.



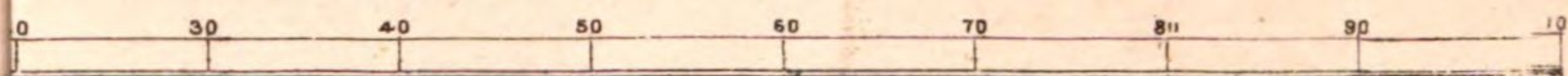
TRANSVERSE SECTION.



THE SARCOPHAGUS OF THE SECOND PYRAMID.

NORTH

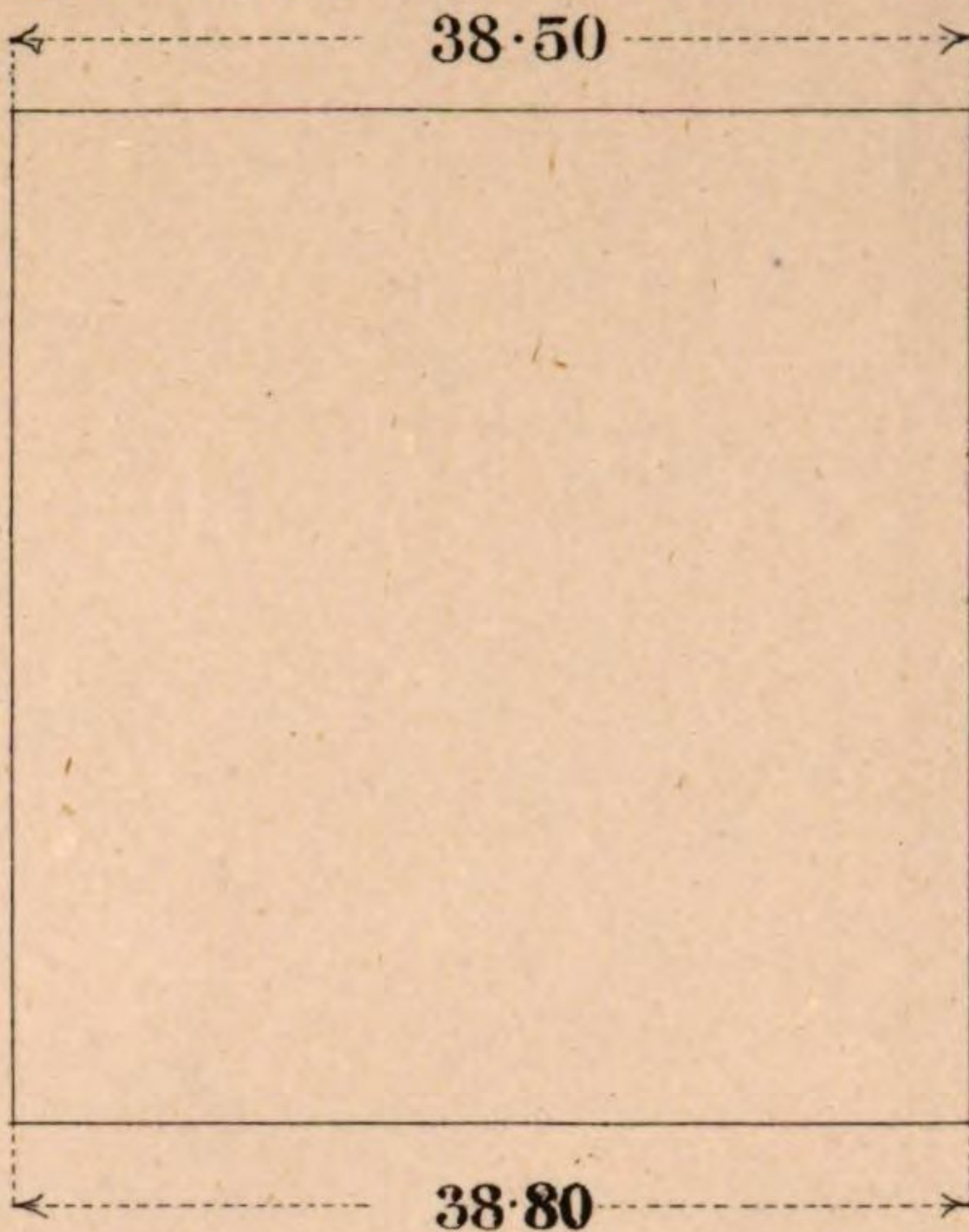
SCALE
OF BRITISH INCHES.



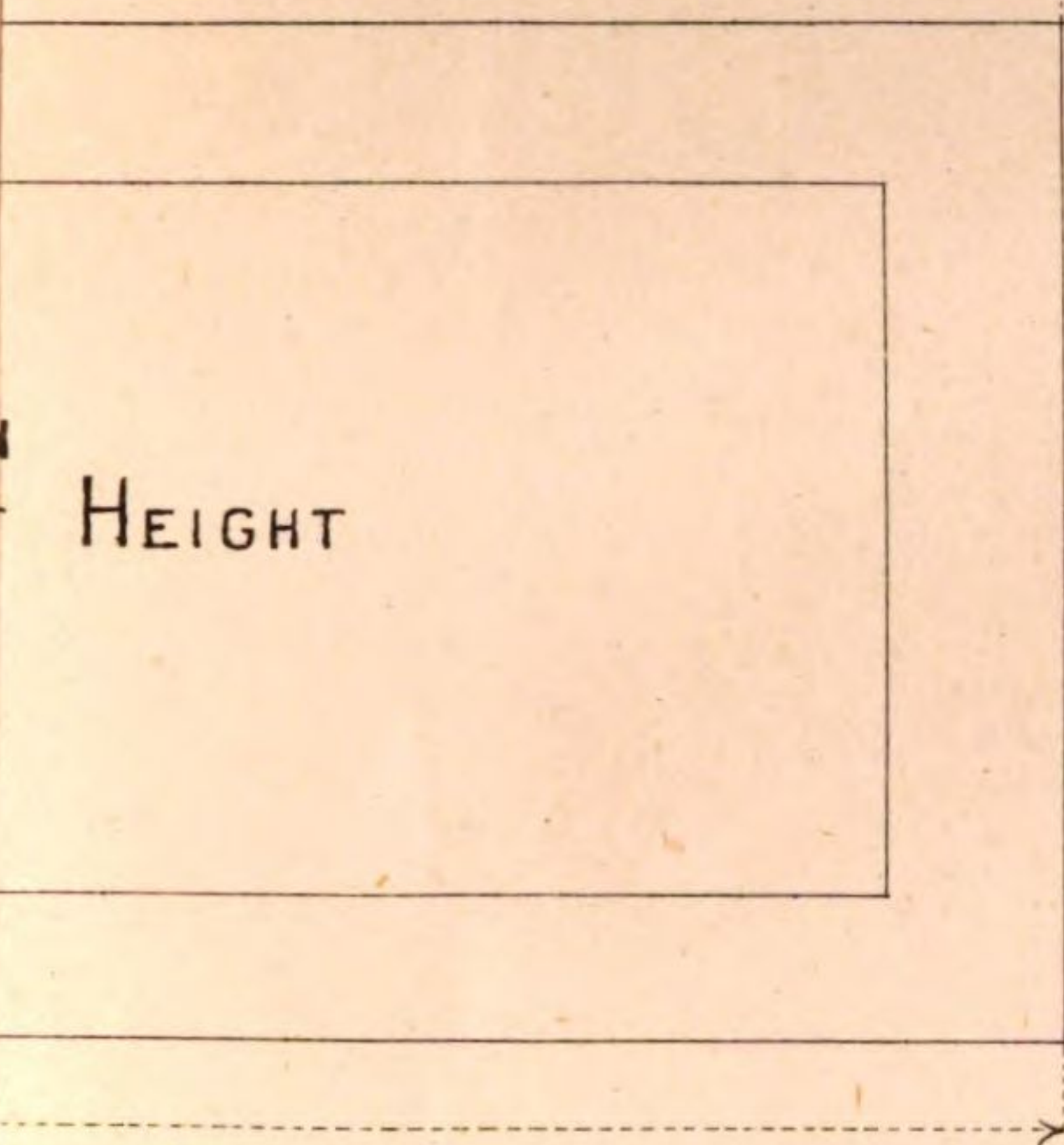
ST SIDE



ELEVATION OF SOUTH END



IDE



HEIGHT

38.70 NORTH END

ER RESTORED

R

MBER

AMID.

KAGES, AND LEDGE

<i>Mean thickness of sides of coffer</i>	5.99	} British Inches.
<i>Mean thickness of bottom</i>	6.92	
<i>Mean inside depth</i>	34.34	

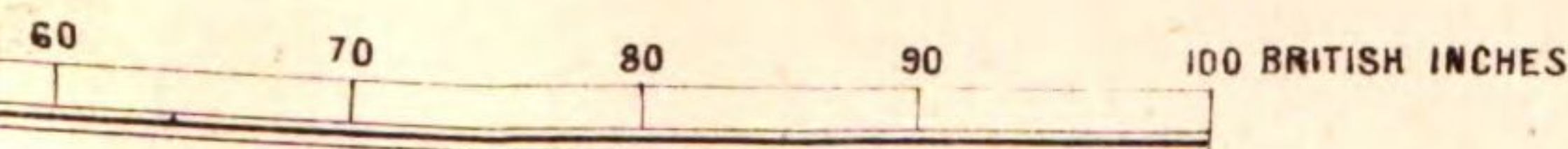
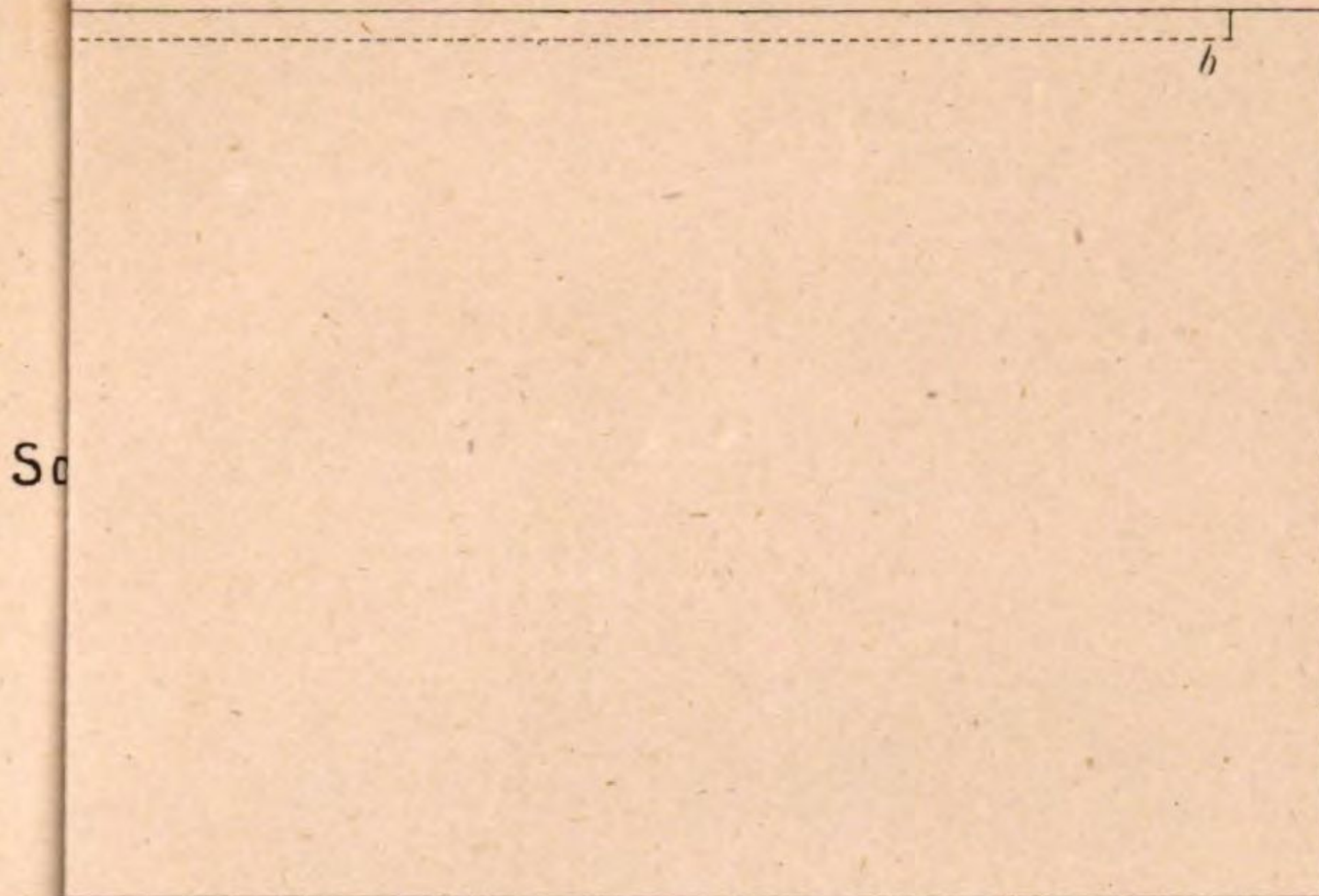


FIG. 3.

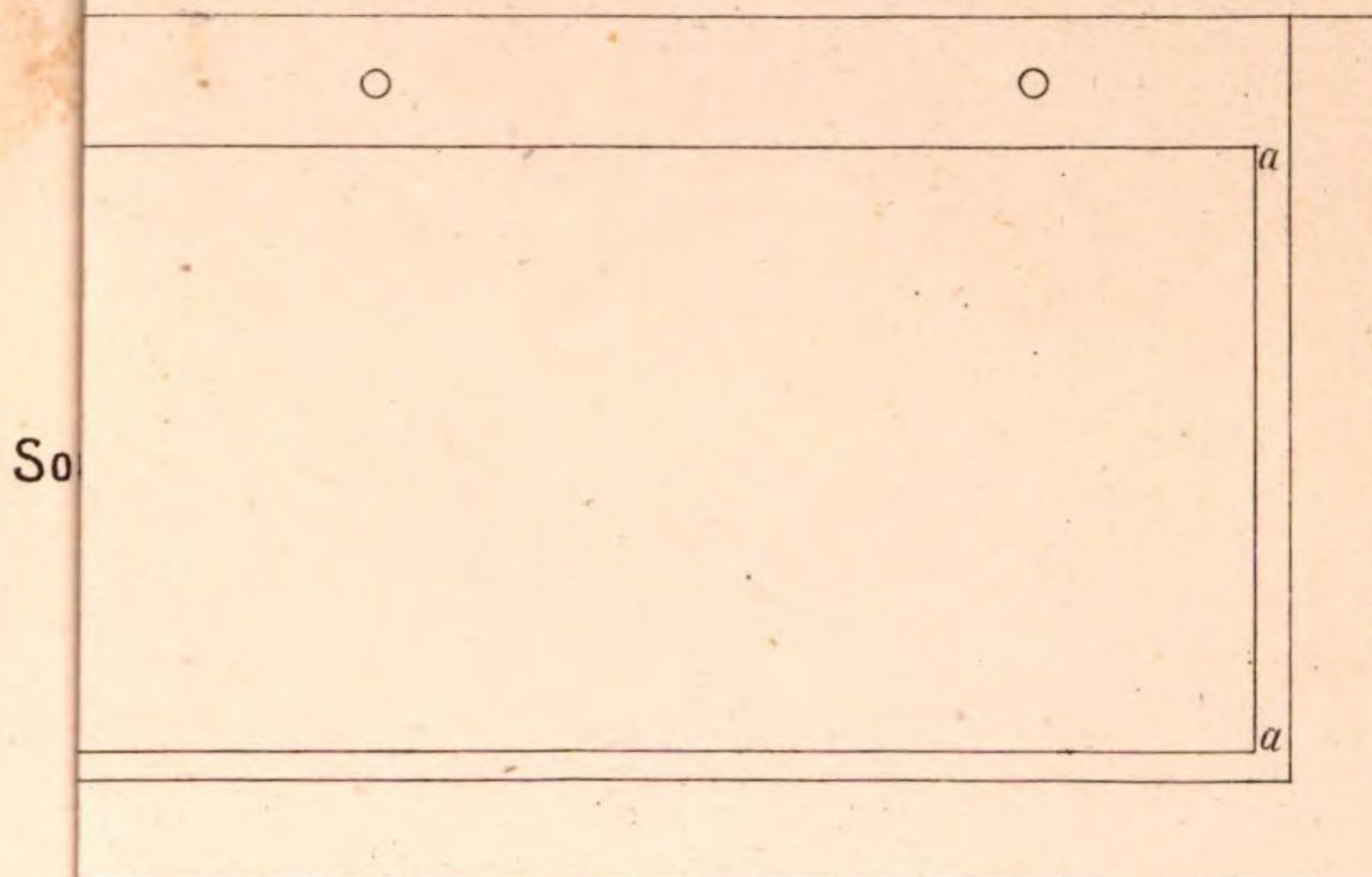
SECTION OF EAST SIDE, RESTORED
EDGE SHEWN BY DOTTED LINE *bb*.



So

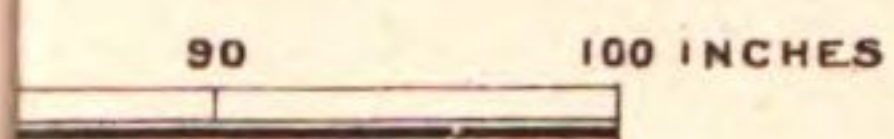
FIG 4.

OFFER IN THE KING'S CHAMBER, RESTORED
EDGES AND FIXING PIN HOLES.

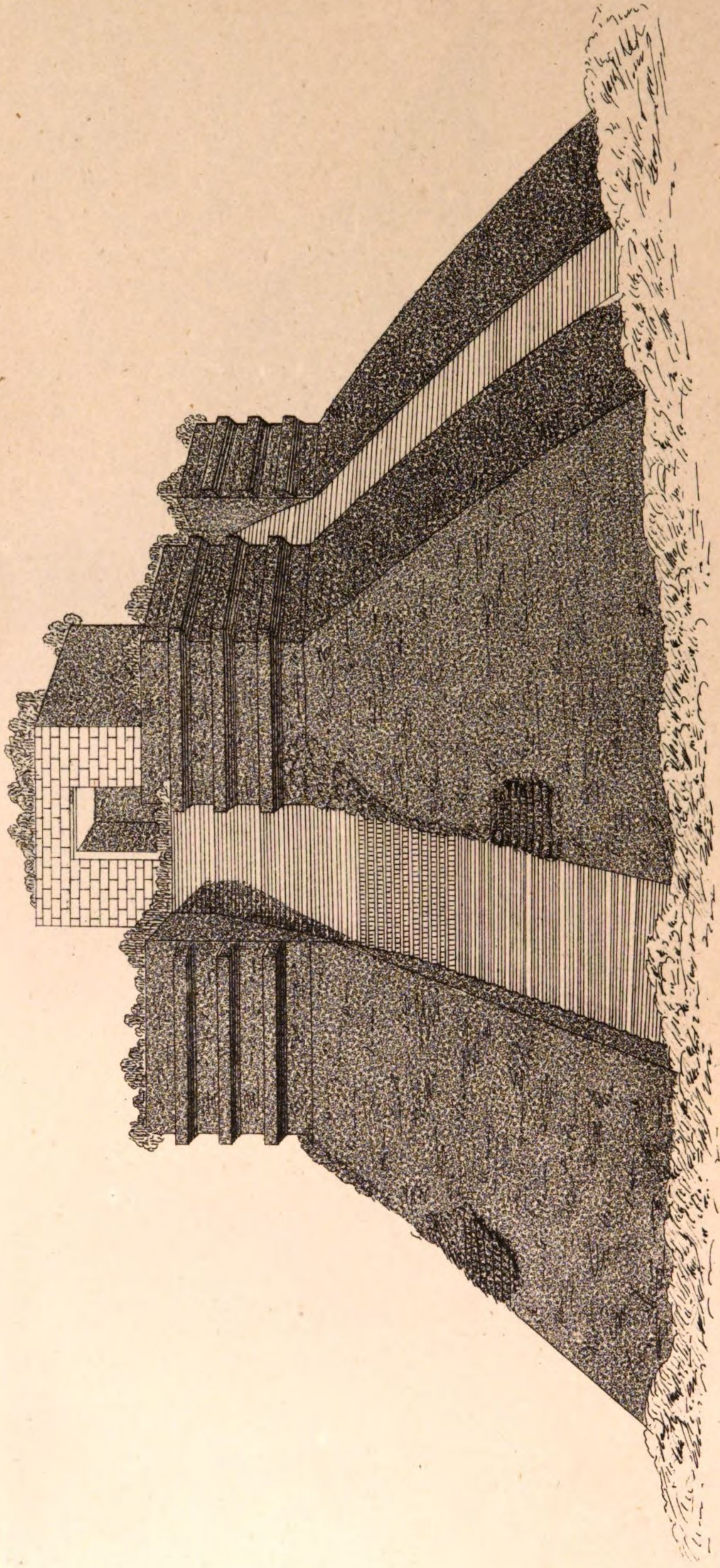


So

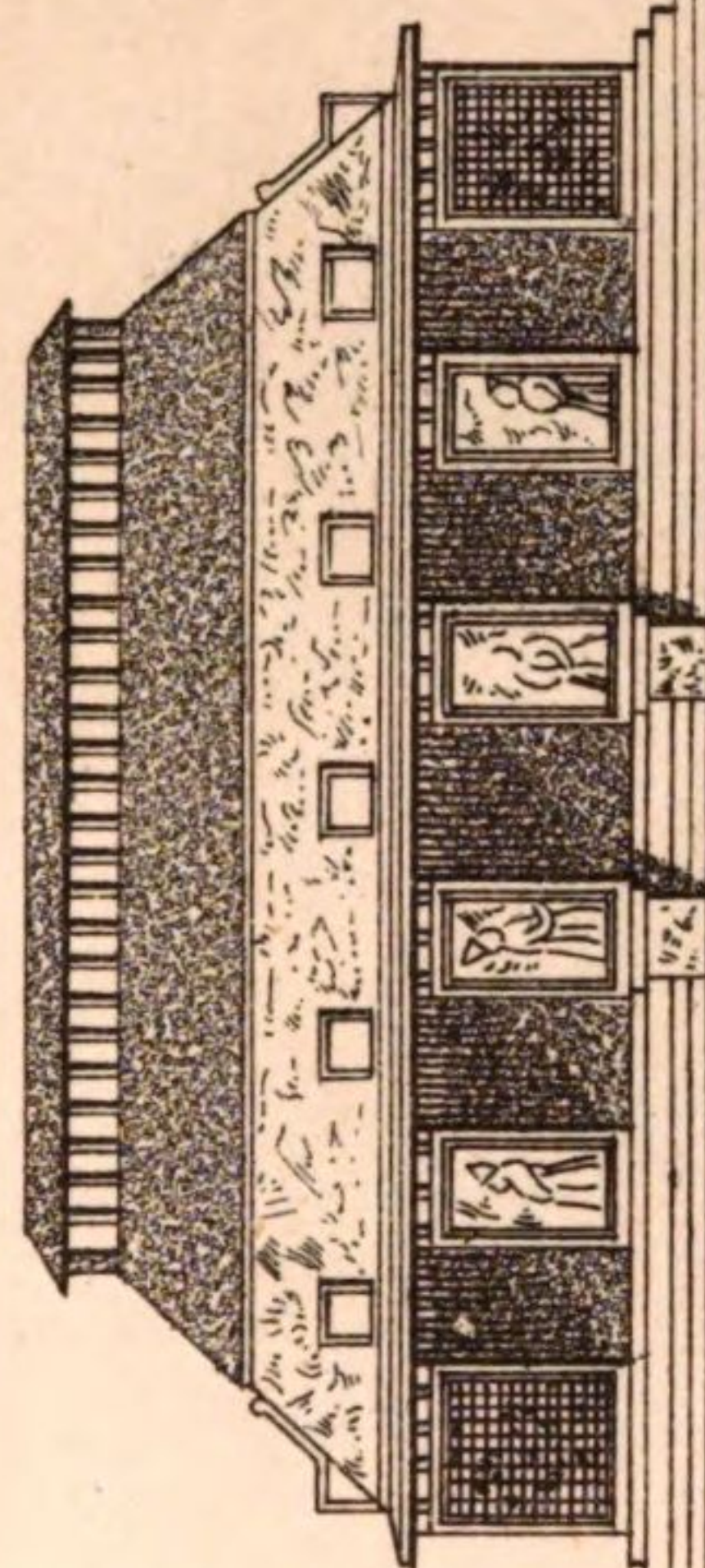
EAST







PYRAMID OF OAJACA TEHUANTEPEC.



ELEVATION OF TEOCALLI AT PALENQUE.

SCALE,
1 1/2 Inch to 50 Feet.

Q
T

E

A

E

11

12

13

14

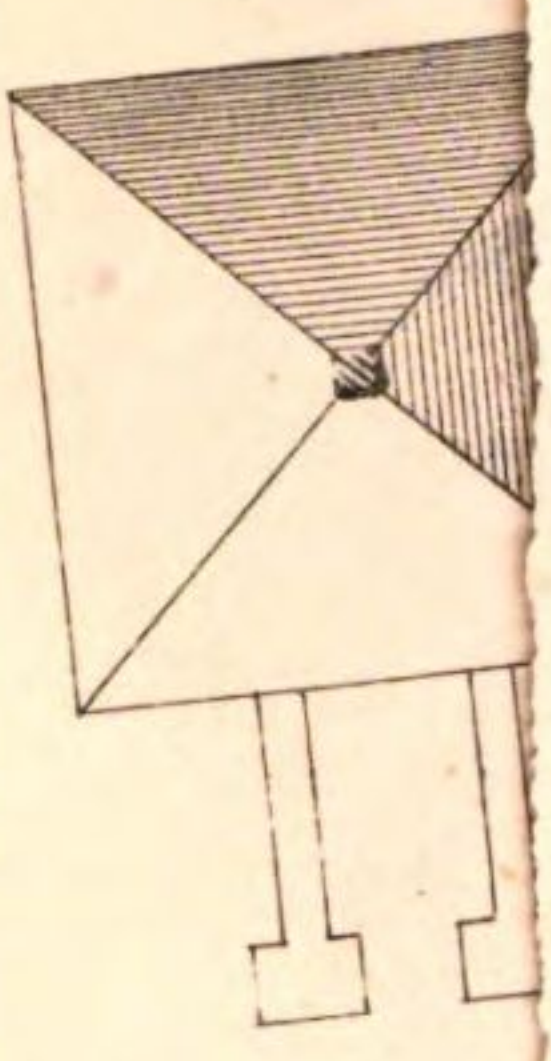
15

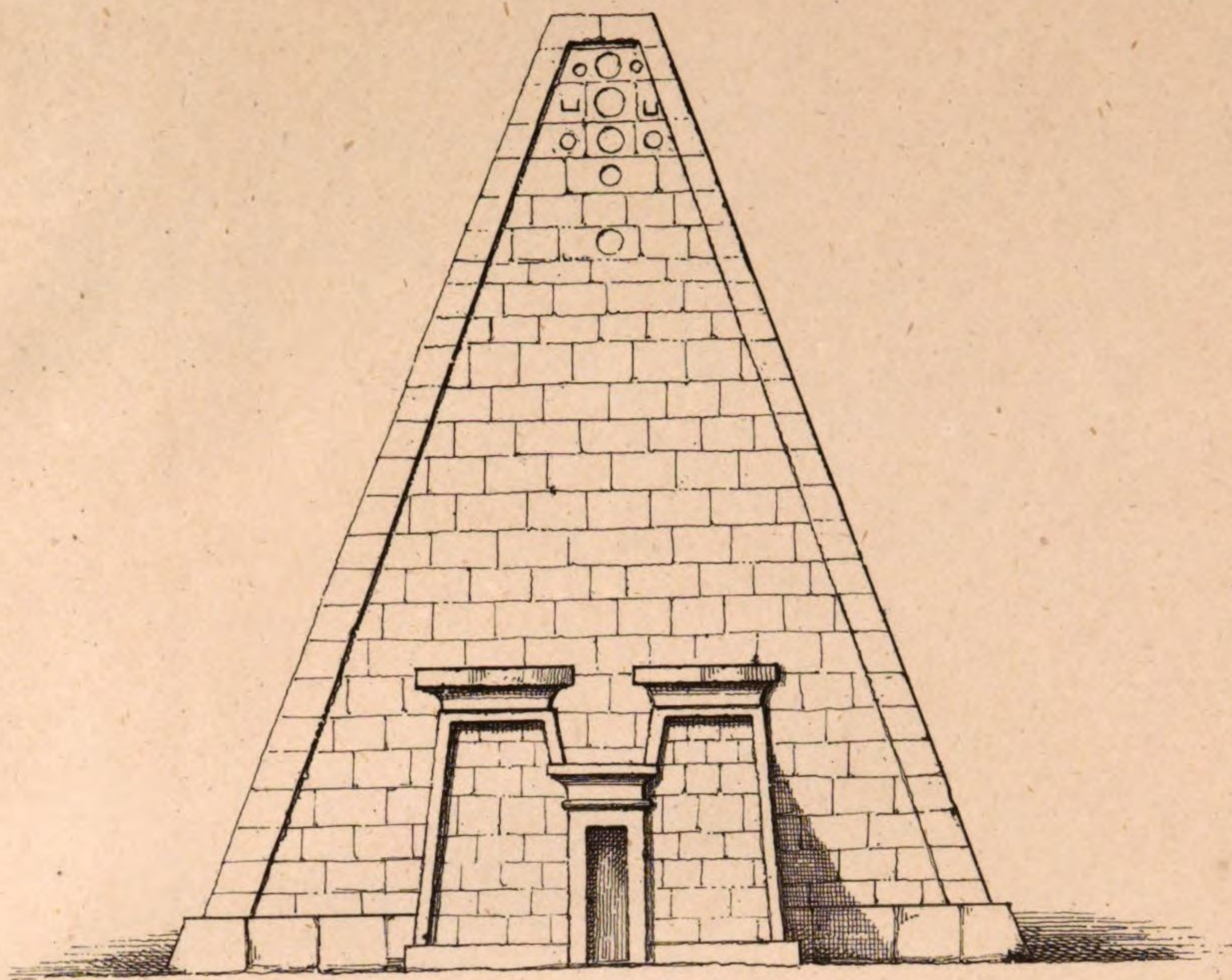
16

17

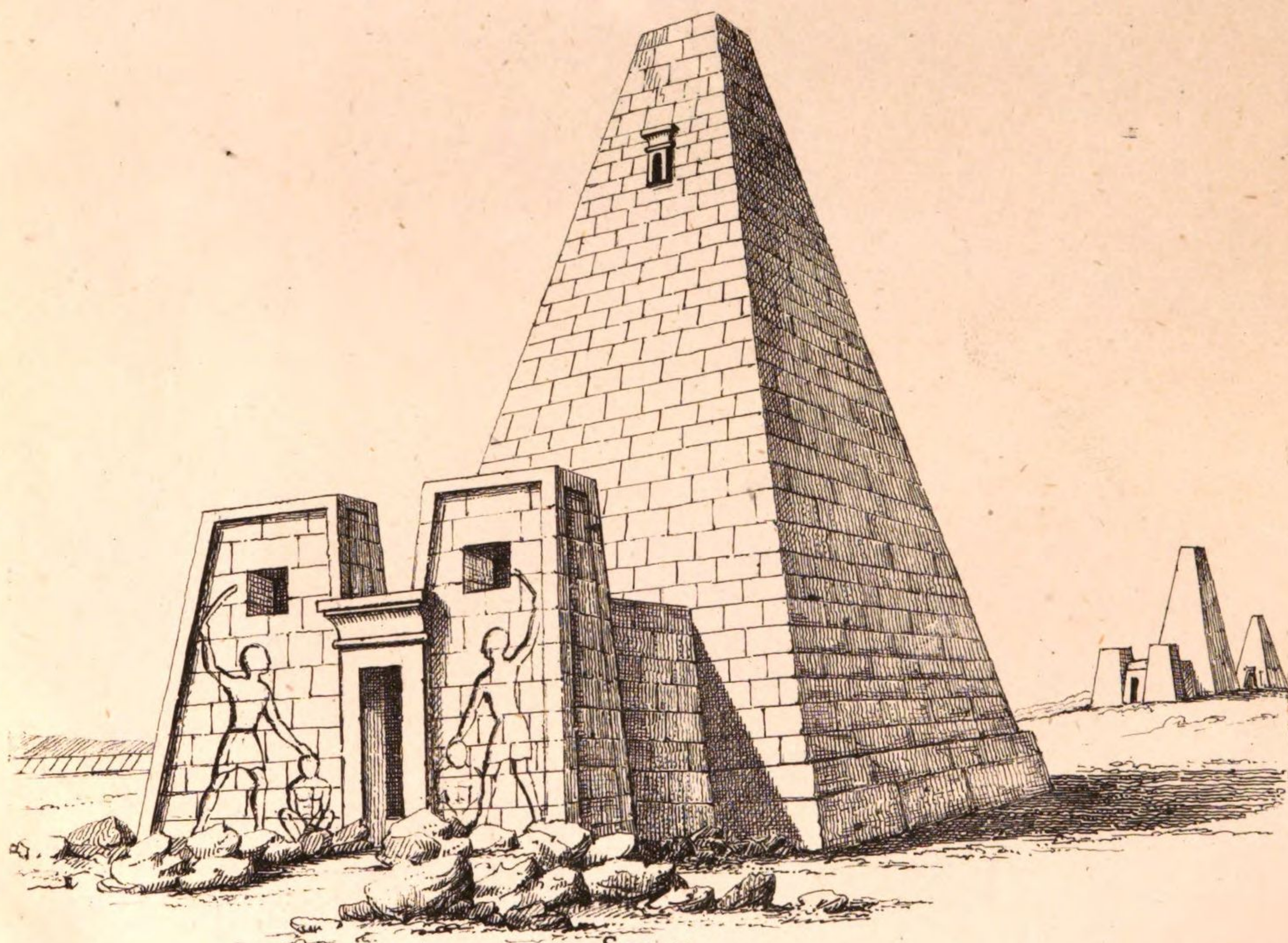
18

19



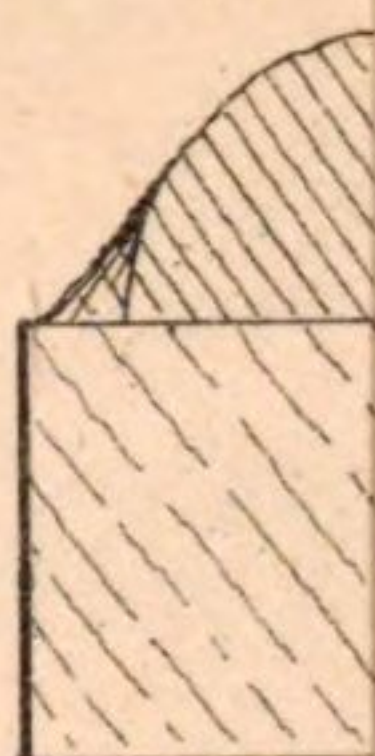


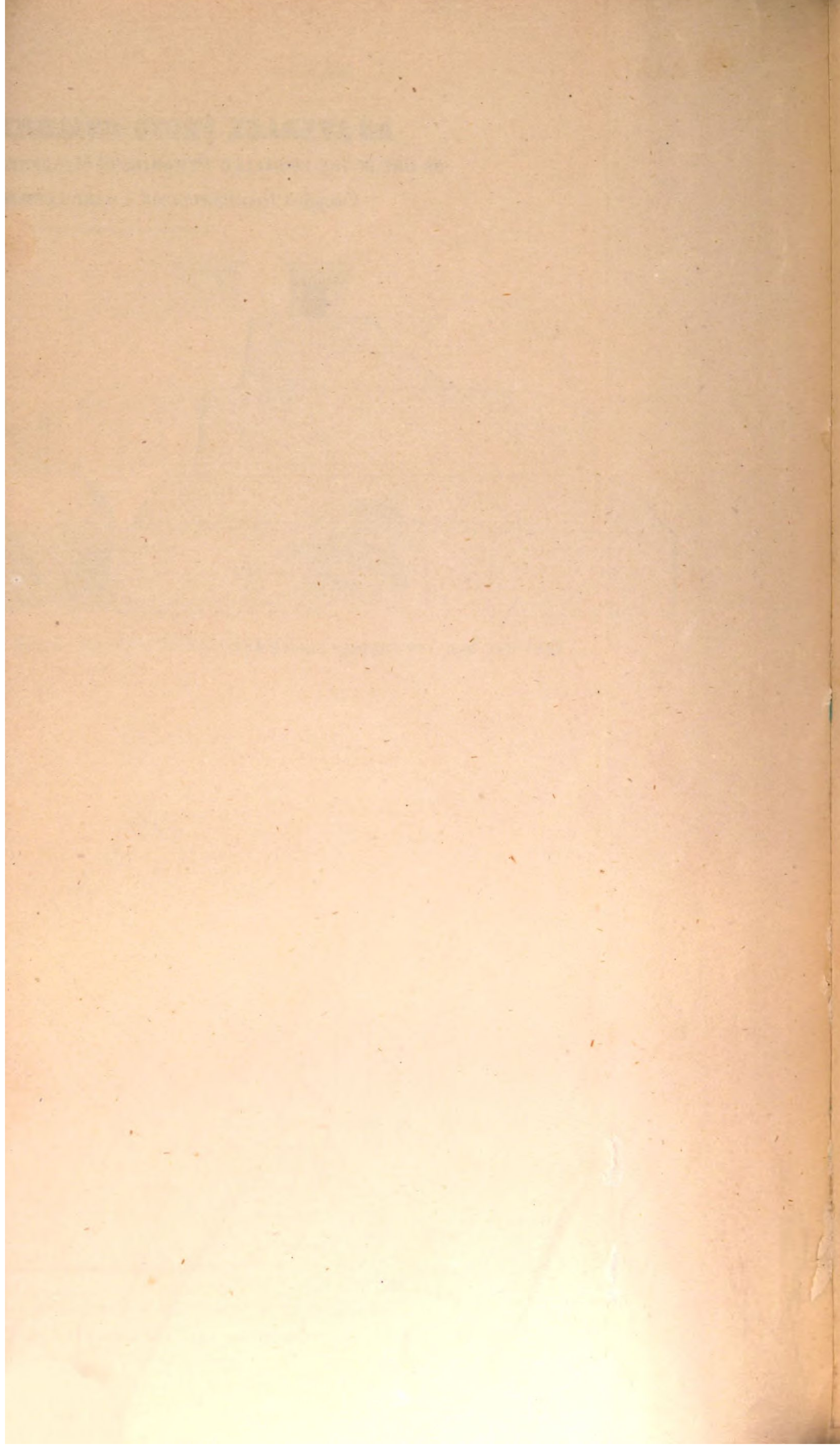
VARIETIES OF MEROË PYRAMIDS FROM LEPSIUS.
EXTREME CASES FOR LARGE SIZE OF PORCHES.



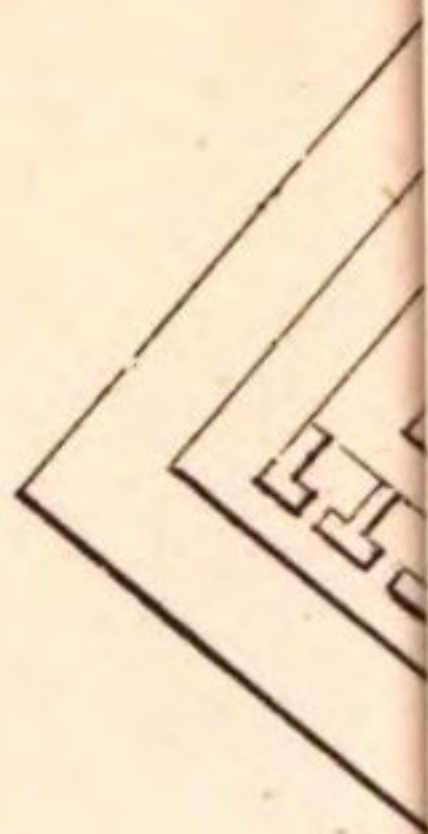
SCALE
0 5 10 20 30 40 50 60 70 FEET

Maclure & Macdonald, Glasgow.





A LATE



Day, St. John Vincent

On some points in certain Theories concerning the Purpose and primal
Condition of the Great Pyramid of Jeezeh: being a Paper read to the
Philosophical Society of Glasgow, February, 1868 By St. John Vincent Day.
And in chief part a Reply to a Lecture delivered to the Royal Society of

Glasgow 1868

Arch. 29 im

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